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SENATE SELECT COMMITTEE TO INVESTIGATE

PRICE MANIPULATION OF THE WHOLESALE ENERGY MARKET

OVERVIEW OF INVESTIGATIONS, STUDIES, AND REPORTS REGARDING THE ENERGY CRISIS

STATE CAPITOL

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Reported by:

Evelyn J. Mizak
Shorthand Reporter

APPEARANCES

MEMBERS PRESENT

SENATOR JOSEPH DUNN, Chair

SENATOR DEBRA BOWEN

SENATOR MAURICE JOHANNESSEN

SENATOR WILLIAM MORROW

MEMBERS ABSENT

SENATOR WES CHESBRO

SENATOR MARTHA ESCUTIA

SENATOR SHEILA KUEHL

SENATOR BYRON SHER

STAFF PRESENT

LARRY DRIVON, Committee Special Counsel

ALEXANDRA MONTGOMERY, Committee Consultant

RONDA PASCHAL, Committee Consultant

WADE TEASDALE, Chief of Staff to SENATOR MORROW

JUDYANNE McGINLEY, Deputy Legislative Counsel
Office of Legislative Counsel

ALSO PRESENT

EDWARD KAHN, Ph.D., Consultant
Analysis Group/Economics, San Francisco

SEVERIN BORENSTEIN, Ph.D., Director
University of California
Haas School of Business, University of California
Professor, Business Administration and Public Policy

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P-R-O-C-E-E-D-I-N-G-S

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CHAIRMAN DUNN: Let's go on the record. We have a few housekeeping matters here.

We were waiting just a few minutes, for those who are curious, because a few of our Senators are a little bit behind schedule, but I don't want to delay our witnesses too much longer, so we're going to get going.

JudyAnne, just so you know, we have two witnesses today. After the second one is sworn in, I don't think there's any need for you hang around. We don't want to hold you unnecessarily.

I'm sure witnesses would like to follow, be sworn in and leave, too, but we probably have to establish different rules of order for them.

Let's begin. I want to welcome everybody to what I think is our fourth hearing for this Select Committee. We have two witnesses that will be testifying today. I hesitate making any promises about time, because every time I've done that, I've been seriously off. When I've said we're going to finish at 4:00, it's usually 7:00. So, maybe I'll say we'll finish in about five minutes from now so that by 3:30-4:00 clock, we might actually be wrapped up.

I want to talk a little bit before we get going about what we've seen thus far, trying to do it factually with no editorial bent to it; although, I suspect a few people might disagree with my ability to do that.

I also want to touch upon procedurally where we are on subpoenas and other assorted matters. I'm sure many of you watched with great interest the Rules Committee hearing yesterday. So, I want to touch upon that and bring everybody up to date.

I know also that there are some press individuals here, and there are some that are monitoring it. I'd also ask for those committee members that are here, we hang around. If there are any inquiries at that time, we can handle them then if I, for some reason, miss any items that people are concerned about.

As I said, today is our fourth hearing. Basically what we have seen thus far in our previous three, which has included the testimony of Professor Frank Wolak, Professor Eric Hildebrandt, Anjali Sheffrin, the State Auditor, Loretta Lynch, and man by the name of Robert Pease -- I emphasize Pease as opposed to Peace -- who is one of the lawyers for FERC out of Washington, D.C. The last three witnesses that I just indicated testified in our Orange County hearing of approximately two weeks ago.

I know many folks that are Sacramento-based did not have an opportunity to travel to Southern California to attend those hearings.

Most of the testimony thus far has been zeroed in on the issue of market power, and whether in fact market power exists in the California wholesale electricity market, and whether in fact, if it exists, if there has been an exercise of market power.

We really have not touched in any degree on the issue of what's oftentimes referred to as collusion, or concerted action, or collateral action. We may touch upon that today, but that's more the focus of our upcoming hearings as we roll into June.

Most of the witnesses we've had testify thus far indicated that in their professional opinion, they believe there is an existence of market power. For the curious, nobody has named names, primarily due to the issue of confidentiality that covers many of our regulatory folks: Professor Wolak, Eric Hildebrandt, Anjali Sheffrin, et cetera. So, there hasn't been any naming of names at this point in time.

But it seems to be a view from those who have testified thus far that there is market power on the California wholesale electricity market that exists in the hands of several market participants, and that it is being exercised in a variety of different ways.

I want to underscore something that many of the market participants raised time and time again, which is, or an accurate statement of that is that market power alone does not constitute any inappropriate or illegal activity. I think that is a correct statement.

The real question is whether the existence of market power has a relationship to the regulatory scheme, and also whether market power is being exercised in a collateral or collusive fashion, and that changes the dynamics of the existence of market power.

I do want to touch upon one thing that the FERC lawyer, Mr. Pease, indicated towards the end of his testimony on Friday. I think we were approaching about the 7:00 o'clock hour or thereabouts when it occurred -- our apologies, Evelyn. And that is, that he indicated in his opinion that the California wholesale electricity market is not a competitive market. Which, of course, the existence of a competitive market is the is the underlying assumption for market-based rate authority by the FERC.

Let me touch upon the subpoenas very quickly. We submitted a request that was heard yesterday in Rules for subpoenas to the following entities: Duke, Dynegy, Williams, Mirant, Reliant, Enron, AES, and NRG, and also FERC.

The committee did not rule on any of those requests, but indicated that it would do so shortly. My personal hope was that would be done today. It was not due to time constraints. I'm not sure when they'll meet again, probably Monday, although I can't guarantee that.

There were some questions that were raised about all of the subpoenas, particularly the FERC subpoena, so we will simply wait for a ruling from the Rules Committee.

The subpoenas with respect to the individual companies that I named, as opposed to FERC, were as a result of our somewhat slow, and at times just plain stalled, discussions with the market participants regarding confidentiality and other concerns. I don't want to just limit to that, but that, of course, is one of largest that we have not been able to resolve. And we felt we had to take a step forward and follow-up the document requests, which included 87 categories of documents that were made or submitted around April 5th to each of those

market participants. We felt it was a necessary step to basically turn those into subpoenas at this point in time.

The Chair of the Rules Committee yesterday raised questions about the subpoena on FERC. And I want to make sure everybody understands where that came from.

When we had the testimony from Mr. Pease, the FERC lawyer, two weeks ago in Orange County, it was through his testimony that it seemed clear that the only way to at least flush out whether we, a State Select Committee, can gain access to FERC documents was going to be via a subpoena. No one's under the impression that service of a subpoena by this legislative body upon FERC will, all of a sudden, cause FERC to go, "Oh, okay, here's all the documents." We know that; we understand that.

But the FERC lawyer indicated that that was best first step to flush out that dispute and put it into whomever's hands, whether it's judicial or otherwise, that can resolve the issue about our access to FERC documents relating to the behavior of market participants on the wholesale electricity market. So, for those who are curious about why that subpoena, that's where that came from.

With respect to the ISO subpoena that was issued several weeks ago, ISO has fully complied with that subpoena and provided us their documents, many of which are covered by confidentiality agreements, which we agreed to abide by.

The PX subpoena has not been responded to as far as production of documents, but they indicated they would fully comply. We expect the production to begin, hopefully, next week. That's a little more complicated than the ISO subpoena, so we understand that it's going to take a little bit more of an effort and work to actually produce the documents via the subpoena on the PX.

In addition, we have made a request upon Morgan Stanley, not a subpoena but just a document request for certain documents relating to the sale of the California generation assets. We've been, unfortunately, playing telephone tag. I'm not finger-pointing at Morgan Stanley or its representatives at all. We have not been able to connect. They have been trying to reach us to discuss that request, but that has not been completed yet. The telephone tag game continues at this point in time.

Housekeeping also, we've gotten many requests for the previous transcripts. Copies of the transcripts of the first two hearing are now available through the Senate Publications Office. We expect the transcript from the third hearing to be available relatively soon, potentially early next week, also through Senate Publications. And, of course, video tapes for all three hearings, if you are suffering a little bit of insomnia, are available through Senate TV. Those are already available.

Hopefully, we've covered all of the necessary procedural things. I would like to open it up to the other members, but since we don't have any here, we can't invite any comments. Certainly I will open that up at the time that we have other committee members.

By the way, I think most of the individuals know who this person is sitting next to me, to my right. This is Larry Drivon, who is Special Counsel to the Senate Select Committee on the Investigation.

What Larry just indicated to me is, I've referred to Mr. Pease, Robert Pease from FERC, the lawyer from FERC. He is Chief Counsel to the investigations that are being done at FERC. So, I hope no one interpreted my comments as just any old FERC lawyer. He has a unique involvement in the examination of the California wholesale electricity market. So, that is Mr. Pease's role.

He came to testify as a result of our request for one of the Commissioners to come testify. The FERC legal staff felt that that would not be an appropriate role for the Commissioners. And in the Commissioner's stead, Mr. Pease volunteered his services, which we greatly appreciate.

With that, I think I have covered all the housekeeping matters.

Thank you, Professor, for tolerating all the housekeeping. Are you ready to begin?

MR. KAHN: Yes.

CHAIRMAN DUNN: Thank you very much.

JudyAnne, if we could have you do your duty. We need to swear you in.

MS. McGINLEY: Will the witness please stand and state your name for the record.

MR. KAHN: Edward Kahn.

MS. McGINLEY: Will you please raise your right hand.

[Thereupon the witness,
EDWARD KAHN, swore to tell
the truth, the whole truth,
and nothing but the truth.]

MS. McGINLEY: Thank you.

CHAIRMAN DUNN: Mr. Kahn, do you prefer Doctor or Professor? What's your formal title in your profession?

MR. KAHN: I prefer Mister.

CHAIRMAN DUNN: You've got it. Then we will do it as Mr. Kahn.

Mr. Kahn, can you give us just very briefly a little bit of background about yourself, and also your current involvement in examining the energy crisis that we face here in California, just so everybody knows your role and your background.

MR. KAHN: Sure.

I'm a principal at a consulting firm called Analysis Group Economics. My office is in San Francisco. I have about 25 years of professional experience, studying and working in the electricity industry. About 20 years of that was at research institutes associated with the University of California. I've been a full-time consultant for the past five years.

In my consulting experience, I've done work for Southern California Edison over the past four years, off and on. I was asked by them to work with Professor Paul Joskow, of the Massachusetts Institute of Technology, on a study examining the behavior of the California wholesale electricity market

during the summer of 2000. Professor Joskow and I prepared a report which Southern California Edison filed in a FERC proceeding last November, and we have subsequently circulated this report as an academic document.

CHAIRMAN DUNN: Mr. Kahn, I understand that you are also continuing your work in this regard, and may, in fact, in the future publish additional data, and that your testimony today is going to be based upon what is publicly available at this point in time; correct?

MR. KAHN: That's correct.

CHAIRMAN DUNN: In addition to that, are you covered by any sort of, due to your professional arrangements, any sort of confidentiality agreements?

As you know, we've had Professor Wolak and Mr. Hildebrandt, et cetera, and they're covered, of course, by some of the FERC confidentiality tariffs and so forth.

Are there any such provisions that cover your work?

MR. KAHN: With regard to what I have to say here today, the answer is no.

The design criterion for the study that we did for Southern California Edison is that it be confined to publicly available information. So, we do the best we can with that kind of information, and we think we do fairly well.

On the other hand, as you know, there's a whole lot of information which is confidential, and we did not have access to any of that in the work that I will describe today.

CHAIRMAN DUNN: It is my understanding that you

have prepared a presentation for us today, that basically I can say, go with it, and you're ready to go.

MR. KAHN: Yes.

CHAIRMAN DUNN: With your indulgence, if you don't mind if we interrupt you along the way. As you know, you're dealing with lay people here, trying to come to an understanding of all this. And if you don't mind, we may interrupt you along the way for some clarification for us outsiders looking in.

MR. KAHN: I'm here for your convenience, so however you want to do this.

CHAIRMAN DUNN: That'll be great.

Mr. Kahn, why don't I just let you go at this point in time with your presentation that you've prepared for us today.

MR. KAHN: Thank you.

I'm going to use Power Point slides. This is material that I have presented elsewhere. It is a summary of the report that I described.

This gives the fairly long title of the document, and I'm just going to go through these. We will get to a bunch of numbers, and I'll not trouble would you with them in too much detail.

As I said before, the basic idea here is to see what we can uncover under the restriction of publicly available data. We basically are trying to ask two questions. One is,

are there fundamental supply and demand factors that can explain the observed prices in the wholesale market during last summer?
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And to what extent can they explain it and can they not explain it?

We tried to -- just to jump ahead a little bit, the basic answer we find is that supply and demand factors cannot explain the prices; that there is a substantial gap that remains unexplained.

It is a natural inference when you discover that the prices are higher than the competitive level is to assume that that's due to the exercise of market power. That is an assumption.

So, a natural question would be, well, if it's the exercise of market power, how was it done? And the answer that we give to that is, again, a fairly standard answer, which is, by withholding supply from the market.

So, we essentially do two calculations. One is to make a measure of what we think a competitive price would look like during this period. And then the other is to estimate whether capacity was withheld for -- there are some circumstances under which it would be legitimate not to supply, primarily if the capacity was sold to the ISO to provide operating reserves. That's a perfectly legitimate reason not to supply. There's some other reasons.

What we basically find is, having taken all these things into account, the supply offered into the market was less than what was available. And the inference that we draw is that this power not supplied was the means by which the price was raised. That, in essence, is what we -- what we do.

So, I think this slide, in effect, is going to
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repeat everything I just said, but in a little more detail.

One of the factors, focusing on the second bullet, that we take into account, which was, at least at the time we published this document, a little new, was to take into account the price for pollution permits in Southern California. The South Coast Air Quality Management District operates a market in permits for emitting nitrogen oxides. These are called RTC permits.

During the summer of 2000, the price of these permits escalated very substantially to unprecedented levels, far above the level that the agency estimated was the cost of controls, and that these permits prices, which are legitimate costs for generators, explain a substantial part of the price movement. Substantial does not mean all; it just means substantial. We'll show you a picture.

CHAIRMAN DUNN: And if I could interrupt again. I want to take us to just a little bit more basic level for those of us that are getting exposure to it.

Can you explain real briefly, how does that work? How does the cost of one of those permits rise? What's the process by which that works?

MR. KAHN: This is a program that's generally known as a cap-and-trade program. The air quality regulators say, "We're going to limit the overall emissions in a particular area for a particular pollutant. And we will allow the people who have to control their emissions to trade amongst themselves." If the cost of controls are low for one person and high for another, they can trade the permit.

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The electricity generators have a certain endowment of these permits, but during the summer they used substantially more than they were allocated. So, they had to buy them from people.

And the people who sold them, sold them at what became increasingly high prices.

So, if I'm generator, and I'm bidding into the market, I have to take into account how many permits I'm going to need to operate the plants in question. And as we get to higher and higher demand periods, we get to dirtier and dirtier plants. And so, at the very highest demand periods, some of these plants are extremely dirty, require lots of permits, and so that feeds the demand for permits and raises the price of permits.

CHAIRMAN DUNN: Thank you.

MR. KAHN: We find that the price caps were effective at limiting the ability of generators to raise price during some of these periods. And as I said before, the withholding of supply, which is the principle observable means by which the generators were able to raise price, cannot be explained by factors such as the ISO's demand for ancillary services.

This is a picture which compares the PX price during all hours of these four months, in the light bar, with our estimate of the competitive price during this period, taking all factors into account.

So, you see a very large gap in June, somewhat smaller in July, narrowing again in August, and a rather small

gap in September.

This illustrates the effect of the permit prices on the competitive benchmark. The light-colored bar reflects our estimate of the highest price, which was actually only realized in August or September, but for convenience, we show the $35 a pound price here.

Just for reference sake, before this summer, these permits were selling for about a dollar a pound. So, we're looking at an increase of 35 times, roughly.

So what you see in the difference between the bars is the effect of the high price on the competitive benchmark. In August, for example, this is a $40 effect, very substantial.

This is a graph that shows what the supply curve would have looked like if controls had been installed in a timely fashion, and we don't have to do too much detail. The basic point is, if you control the emissions of the plant, the demand for permits goes down, even at the prices realized if they emitted less. Then the supply curve would have been lower, and prices would have been cheaper, and that's all that this picture shows.

This is an illustration of our withholding calculation. And we refer to the amount not produced as an output gap. We measure this for certain high priced hours. It's not interesting to look at hours in which the price was relatively low, because that usually means the demand was low. And if they didn't supply, well, that's perfectly economic.

But when the price is high, and when people are

alleging that there are shortages in the market, that's the time when withholding really matters.

So, this is an illustration of the average amount of withholding by firm in the northern part of the state and in the southern part of the state during July. And this covers a period of about 120 hours, not quite 20 percent of the hours in June.

I guess, unlike your other witnesses, we are naming names here.

This is sort of the raw data that needs a little explaining. The bottom line is, the ISO acquires ancillary services from generators by zone. So, when we look at the NP 15 generators, and add up the amount of capacity withheld, and compare it to the ISO demand, we will find that the amount withheld is less than the ISO demand. Therefore, we can conclude nothing about the NP 15 generators.

The matter is quite different in SP 15. In SP 15, when we add up the sum of the withholding of the four generators, and compare that to the ISO's demand for ancillary services, the sum of the withholding substantially exceeds the ISO's demand, so therefore, holding capacity back to provide these legitimate services is not an excuse for the high prices.

Now, I'd like to show you some of the flavor of the details, and I warn you about the bewildering array of numbers.

This is a table that summarizes the effect of the NOx allowance price on our competitive benchmark during a five-month period. The average PX price in the second column is

what is observed. The five columns in the middle are our competitive price. And if you look at the zero column, that, I think, goes back to an earlier graph which said, what would the price have been if there were no effect of the pollution permits?

Then, the bold figures correspond to our estimate of what the price was during the summer. You can see that it goes from effectively zero in May to $10, we think at most, in June, to about $20 in July, and we're estimating $35 in August and September. So, among other things, that shows you a trajectory of these prices.

Another factor widely discussed in terms of the price increases has to do with the lack of imports. California has historically depended upon imported generation to meet our demands. This has been going on for more than 20 years. This is not a new phenomenon.

What was new is that in the year 2000, the amount of imports was substantially less. So, the first two rows shows you estimates of imports in those two years, and you can see that it's going down by 2500 megawatts, almost 4,000 megawatts, 5,000 megawatts let's say in August, about 4,000 megawatts in September.

So, this is a very substantial amount of power that we had normally relied on which was not available.

The rest of the table just shows what that would have done to price under different assumptions about the NOx price if we had had the historic level of imports.

It's generally believed that we didn't have these

imports because of demand growth, or possibly hydro problems, in other parts of the west. No one really knows for sure. I've never seen a decent study of this. So, maybe that's true, and maybe it's not. Don't know.

CHAIRMAN DUNN: Do you know, Mr. Kahn, has anybody to your knowledge tried to study that in any great depth?

MR. KAHN: I have read reports in the trade press of people making assertions on that study. I have not seen a study that I believe addresses that in any comprehensive fashion.

And it's not a trivial thing to do.

CHAIRMAN DUNN: As you can probably well imagine, throughout this entire debate here in California, we hear that assertion a lot.

MR. KAHN: Yes.

CHAIRMAN DUNN: But I agree with you. At least, I haven't seen one, and not that I'd necessarily be the first one exposed to it, but I have not seen any such study to really analyze the merits of that.

MR. KAHN: Well, given the long period of time I look forward to spending on this problem, for the rest of my life, I somehow imagine that I will have an opportunity to address that question. But it hasn't come yet.

CHAIRMAN DUNN: We can only say that we hope we don't have to examine this any more beyond tomorrow, to be perfectly honest with you.

MR. KAHN: Well, you're more optimistic than I.

CHAIRMAN DUNN: I suspect you are the one who is accurate about that.

MR. KAHN: This next chart is related to a graph I showed previously, which says: If NOx controls had been put in, how much lower would the competitive price have been? And the answer is lower, and by a fair amount.

There is a dispute about why the NOx controls were not put in. And as you can imagine, there are two sides to the story. The generators would say that SCAQMD took a long time to process their applications and they couldn't get it done in time.

CHAIRMAN DUNN: That's S-C-A-Q-M-D.

MR. KAHN: It might also be a possibility that the generators were less than perfectly diligent in trying to put these controls in.

I think as far as going forward, this is, as I understand it, a moot issue, that the controls will be installed. So, this summer, NOx permits are not going to be anywhere near the big issue in the market that they were in the past. First, because controls will be on the units. And secondly, because the SCAQMD has capped the price for excess emissions at $7.50. So, this is of historic interest, but not going forward interest.

Now I'd like to talk a little bit about our analysis of the physical withholding. We relied on two data sources here. The first one comes from the Environmental Protection Agency. They have a monitoring system on all steam generators throughout the U.S., in fact. And so, they report

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hourly data on the production of electricity by all plants that are so monitored.

This is an extremely valuable data source, and it is ironic that an environmental agency is the one to have produced the data that allows us to investigate economic behavior.

The EPA data base excludes gas turbine units. Gas turbine units are -- this is just the regulatory history, and I frankly don't know why. But the reality is, gas turbine units are not included in this EPA data base, and so, our ability to understand the hourly behavior of those units requires that we look elsewhere.

Southern California Edison made available to us a data base known as the WSCC Extra High Voltage Data Base. This is a data base that is available to all members of the WSCC. It doesn't quite meet the test of completely public in the sense that the average citizen is typically not a member of the WSCC, and so therefore doesn't have it. All the generators, of course, do. This is a data base that has in the past been made available to all participants on an hourly basis, so that if I'm a participant in the market, I can observe the total output of all my competitors at all of their stations in virtually real time.

This data base does cover some of the gas turbines, and so we made some use of it.

We do -- as I said earlier, we restricted our analysis to certain high priced periods where withholding would have economic effect. We compare actual output levels to

maximum capacity, and then try to give them every possible break and say, you know, all right, you had to hold back some from ancillary services.

Again, we don't know how much they actually supplied because that's confidential data. The ISO knows how much each generator supplied in each hour. We don't know that. All we know is the sum total of the ancillary services procured from generation in the zone. That means that we have to restrict ourselves to analysis on an hourly basis in the zone.

We also take into account transmission constraints. So, for example, the Southern California generators upon whom we lavish our greatest attention would have a legitimate reason not to supply if there were congestion going from south to north, because their plant would have been constrained off.

We find this to be an extremely minor effect. The ancillary services is the big one.

These are the price thresholds we used in the different months. They are fairly arbitrary. I think this just sort of repeats the factors that we took into account.

This is a widely quoted table of ours, and it summarizes numerically what I think I said earlier. If we look at the NP 15 generators, Duke and Southern, during this period in June, we find them withholding on average 983 megawatts. But during this period, the ISO's average demand for reserve services was 1500.

Now, I could conjecture that most of that 1500 was supplied by PG&E hydro. I don't know that. So therefore, I

can't really say anything about NP 15.

If my conjecture were correct, then I'd have some questions about Southern or Mirant. But as I said, without the ISO data, I can make no inference about NP 15.

So therefore, I concentrate my attention on SP 15, because there, when I add up the sum of the withholding from the four generators, I get 3351 megawatts. I compare that to an ancillary services demand of 1600, so there's roughly 1700 megawatts without any possible explanation.

Now, it also has to be emphasized that of that 1600, maybe some of that actually shows up in the output, because the ISO dispatches the ancillary services, and was known to do this during the summer.

So, what we would really like to do is to know what's the net undispatched ancillary services requirement, which would be lower than 1600. We did not estimate that in this study.

This is a widely misunderstood table in our report. We were trying to ask the question, well, let's look at various definitions of what might have been available to supply. And we construct three different tests.

Test One, which is the one the generators think is very important, has to do with units that were running in the hour. How much was not supplied by units that were running in the hour? So, that's 1954, as opposed to 3300 on the previous slide.

But just because a unit wasn't running in the hour is hardly conclusive. If I want to withhold, why not just

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not turn it on? So, Tests Two and Three address the "why not just turn it on," and they show that the withholding is substantially larger by various different definitions of when you're looking at -- when the unit last ran.

CHAIRMAN DUNN: Mr. Kahn, if I can interrupt.

Have you had any discussions with any representatives of the generators? If they're adhering to Test One, do they have a response to the, well, why don't we just not run that unit, and therefore, it's not going to be counted under Test One?

MR. KAHN: We don't have much in the way of dialogue with the generators. We expect that these dialogues will be in the nature of legal proceedings.

There will be some sort of a dialogue of an exchange of papers, an odd form of dialogue, but an interesting one.

This table expands the period from June through September. And unlike the previous analyses, which concentrated only on the CEMS data that has omitted the gas turbines, this one includes them.

And just for some perspective, we are talking about 13 or 1400 megawatts of capacity that differs between these data bases. So, the broadest picture of what's being withheld really should consider these gas turbine units as well.

Now, this is a busy and complicated table, so maybe we should take -- and since it's the last slide, take a little time with it.

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CHAIRMAN DUNN: Senator Johannessen.

SENATOR JOHANNESSEN: You're coming back to the gas turbines. Generally speaking, my experience has been, the gas turbines are most important in the peaks. And if we do not have that as part of the study, that is the area where we may be lacking, if they do not use the peaking plants. Because there is where you normally can say they have withheld the peaking plants during that period of time. Did not fire them up.

I know the hydro; that goes basically all the time anyway.

But does that make sense?

MR. KAHN: Yes, that's correct. What we basically find is, the peaking plants operated to some degree during these high priced periods, but it's not clear that they operated as much as they might have.

SENATOR JOHANNESSEN: Is there any way to find the records of the operations, which I know they keep, the records of the operations of these peaking plants, when they're on and when they're off?

MR. KAHN: Oh, the confidential data has all of this information.

SENATOR JOHANNESSEN: Exactly.

MR. KAHN: The challenge for those of us doing public studies is, are there ways to infer this from the available data? This is a subject that we are currently working on and expect to have some new results on.

SENATOR JOHANNESSEN: Well, it just leaves a large gap, and I'm interested in the gap.

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MR. KAHN: Well, if it would be of interest, I'll try to explain this complicated table.

CHAIRMAN DUNN: Please do.

MR. KAHN: Column one is another -- is the same sort of thing that we measured previously. Let's focus on June, where it says 4330. That compares to the 3350, I believe it was, when we're not looking at gas turbines.

So, roughly speaking, when we add 1400 megawatts of gas turbines, only about 600 megawatts of it operated during this period, because the output gap increases by 800 megawatts.

The second column, the mean ancillary services, that's 1672, the same number we used in the previous slide.

The third column tries to address in a very crude way an issue that I previously raised about -- involving the fact that the ISO actually uses the ancillary services capacity.   It doesn't just sit there unloaded all the time. And they use it when price gets really high, and they're really desperate.

So, it's widely reported, or alleged, that the ISO dispatched the replacement reserve during these high load periods. In this study we did not investigate that thoroughly. That is a matter we are currently investigating.

But if we take just the crude measure and say, well, what if they dispatched all the replacement reserve. Then, instead of 1672, you get 1044. So, roughly speaking, that's a 600 megawatts of the ancillary services actually is in the output and is no longer in the column of excuse for not producing.

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So, the last two columns then just say, all right, what's the net under production once we consider the various legitimate reasons? The mean output gap, considering the total ancillary services, is column one minus column two. Then if we consider the dispatch of replacement reserve, that's column one minus column three.

The basic lesson here is, we're looking at

2-3,000 megawatts not supplied. So, the question is really quite simple: Why? I would expect that the generators will invoke the outage term to cover why.

Then we get involved in a question of, what's an outage? That will turn out to be a philosophical question.

I think that's really all that I wanted to say. I'm sure not all of this is perfectly clear, so I'd be happy to answer any questions that you have.

CHAIRMAN DUNN: All right.

Anybody have questions so far?

I want to go through a couple very specific questions in the report itself. Let me just walk through real quickly, because I know some of it you've already covered.

Go ahead, Senator Johannessen.

SENATOR JOHANNESSEN: For some time, quite frankly, I have felt a little bit like a mushroom, if you know what I'm talking about, sitting, being fed things that I don't particularly want to deal with.

It seemed to me not only is it gaps, but it's in information that, quite frankly, is not available for whatever kind of reasons, whatever it happens to be.

But that is absolutely necessary to make any kind of judgments, and I'm concerned that we do not have that kind of information. There's too much gaps in the information that we do have, and it's too easy to be explained away until we have that particular kind of information that comes from the ISO, that comes from the generators, comes from all of them.

Quite frankly, in order for this to be put to rest one way or the other, these are the kinds of information that has to be acquired. And I hope we are in the process of doing that.

CHAIRMAN DUNN: Which we are, Senator. Great question.

We now have, as Larry Drivon whispered to me just a few minutes ago, in response to your earlier question, we now have that ISO data that is confidential, that I understand, Mr. Kahn, you have not had access to.

We now have that, and we're in the process of making sure it's digested and analyzed for our benefit, Senator Johannessen. And, of course, you have access to it as a member of the committee immediately as well, too.

Yes, you raise a very good question about that.

After you published the study, as you referenced before, there's been limited dialogue -- my words -- between you and the generators, particularly regarding the study.

Have you seen or been aware of any criticism of the study suggesting that it's flawed, or is somehow incorrect?

MR. KAHN: Other than what I read in the press, there is a document authored by Professor Hogan of Harvard

University and colleagues of his and his consulting firm, the Law and Economics Consulting Group. They produced a document sometime towards the end of April which addresses our study, and purports to identify flaws and makes criticisms of what we've done.

But they also say a few nice things, too.

CHAIRMAN DUNN: If you don't mind, can you share with us what are their criticisms of this study?

MR. KAHN: They divide them up according to the two pieces of the study.

On the calculation of the benchmark price, they raise a couple of questions about exactly which resources we counted or not. They raise a question about exactly how we measured the price versus the load.

They have a long discussion about whether generators might have withheld capacity because they couldn't make any money. This is a particularly astounding statement. But they offer up an example, on which we intend to comment, demonstrating that one particular generator on one particular day didn't make any money.

My own feeling is, in a competitive market, you don't always make money. So, the whole notion that every generator must have made money on every day, and that's the standard for competitive behavior, just strikes me as difficult to credit.

SENATOR JOHANNESSEN: Mr. Chairman.

CHAIRMAN DUNN: Senator Johannessen.

SENATOR JOHANNESSEN: I appreciate your point of

view. But in all fairness, if I was a generator, and if I had, more specifically, the gas turbines, and I could not get paid for what I supplied, and being that a lot of the smaller ones didn't -- I know for a fact a lot of small ones did not have the capacity to borrow additional funding, not being able to guarantee payment from the banks, where they had to basically let some, if not most, of their employees go, and they flat stopped generating electricity.

Quite frankly, as a businessman, if they already owe me a lot of money, I don't have the money to buy the raw materials to produce, and I had no particular guarantee of prospect of getting paid, I would be a bloody fool to go deeper in debt until such time as I would be able to guarantee payment.

And that, I think, at least with some of the smaller generators, a lot of them in the 25-50 meg. range, I suspect that is part of the reason they went off, not necessarily because they did it deliberate because -- they wanted to make the money, but there was no way to make money if you can't get it.

MR. KAHN: I certainly agree with everything you said.

SENATOR JOHANNESSEN: I just want to be fair on that end.

MR. KAHN: Oh, I think it's always important to keep in mind that this crisis has a number of distinct stages. And the credit crisis stage, which may have begun last December or certainly by January, was quite a reality.

Those concerns about legitimacy and probability of payment are certainly legitimate. But none of that was operative during last summer.

During last summer, the utilities were accumulating debt, but they were paying their bills. They were borrowing to pay those bills. And the example that's discussed in the Hogan paper refers to June, long before there were any credit issues identified, and did not involve these small generators, but was one particular inefficient unit that had a particularly bad day on one of these days.

Hogan and Harvey offered this up as somehow a reason why 2000 megawatts wouldn't be supplied. We think that that's an enormous leap of inference.

SENATOR JOHANNESSEN: The time period in which you are discussing, that is really before the proverbial hit the fan.

MR. KAHN: Right.

SENATOR JOHANNESSEN: If one can statistically draw a conclusion of the acceleration of what happened, I'd be very interested if somebody wanted to do that statistical projection and see how close that comes to what has actually happened.

Understand, I'm an engineer that went out with a slide rule. So, I don't even know how to turn a computer on, but somebody's smart enough to do that.

CHAIRMAN DUNN: Senator Morrow.

SENATOR MORROW: Thank you.

Mr. Kahn, quickly, just to clarify one point of

confusion here.

Dealing with the Hogan report, Professor Hogan's report, how many reports addressing this issue were conducted by him?

MR. KAHN: Professor Hogan has two papers that address market power issues in the California context. One of them preceded the April, 2001 document. I can't remember the precise date.

SENATOR MORROW: Would it sound like October? I'm just looking at a figure and was confused, because you said the end of April. Apparently there was a report in October.

MR. KAHN: Yes. I think Professor Borenstein will have something to say about that, since it addressed his study.

SENATOR MORROW: I see.

MR. KAHN: So, I think --

SENATOR MORROW: I haven't read either report. The April report addressed --

MR. KAHN: Addressed the Joskow and Kahn study, and the earlier one addressed a study done by Borenstein, Bushnell and Wolak.

SENATOR MORROW: And it was critical of your study in April?

MR. KAHN: Yes.

SENATOR MORROW: I have not read that study yet. I have read your report, but I haven't read the Hogan report yet.

Let me just ask this question. And look, I don't

know Professor Hogan from anybody. I haven't read his report. I have drawn no conclusions.

Is there any reasons to give cause for suspicion in terms of objectivity, credentials, bias, prejudice? I have no idea.

MR. KAHN: Professor Hogan is a well-known person who has made contributions to the study of electricity markets, and no one would say that he's without credentials, and background, and respectable person.

His study was financed by one of the generating companies.

SENATOR MORROW: Which one was that?

MR. KAHN: Mirant.

SENATOR MORROW: Do you know how much?

MR. KAHN: No. All I can say is, when we looked as the acknowledgements, and he had six researchers working on it, what I said to my staff was, well, they had six people on their study, and we only had four, so you guys must be much more efficient than them.

SENATOR MORROW: Before I go on, as far as your study, was there any financing involved with your study?

MR. KAHN: Oh, yes. Our study was financed by Southern California Edison, absolutely.

SENATOR MORROW: Is the Hogan report in April, is that the only report that is critical of your report?

MR. KAHN: We've seen some comments in the press that were critical of it. I've given talks at conferences where representatives of the generators or marketers have begged to

disagree with the conclusions. But these are not -- these are not what I would call, you know, written criticisms.

The Hogan report is 80 pages long, 35 or 40,000 words. It represents a substantial effort. We don't believe that, in sum, what they have to say is terribly constructive, convincing, or important.

And we will be responding to this paper with a document of our own, directly addressing what they have to say. That document should be ready in two weeks at the most, perhaps sooner.

SENATOR MORROW: Obviously at some point, I will read that report, but can you just tell me of now, in the Hogan report, does it rule out, either prove or disprove the exercise of market power?

MR. KAHN: In my view, it proves nothing, and it states affirmatively very little. It's a long litany of criticisms of what we did, and there's relatively little overall conclusion, other than, golly gee, it's kind of hard to figure this stuff out, and Joskow and Kahn, they tried, but they made some mistakes which we allege to have pointed out.

SENATOR MORROW: So, the report itself doesn't come to at least a firm conclusion that there was no exercise of market power, that there was no withholding?

MR. KAHN: No, no. They conclude that you can't tell. It's all -- it is a paean to agnosticism. They just don't know, you know? Golly gee, this stuff is really hard to figure out. And, you know, maybe yes and maybe no.

SENATOR MORROW: Are you aware of any reports or studies that come to the conclusion that there was no exercise of market power?

Or, let me take it one step specifically, and that is, that there was no withholding of supply to accomplish that?

MR. KAHN: I have -- I was at a conference where a fellow from Enron gave a talk in response to our paper, in which he alleges exactly that, that it was all just supply and demand fundamentals, opportunity costs for the generators, and no market power.

SENATOR MORROW: I can easily say that myself.

But was there any indication that there was a written report or a study done to that effect?

MR. KAHN: No. He put up a few slides and view graphs, but didn't hand out the interesting ones.

SENATOR MORROW: Was this an employee?

MR. KAHN: Yes, he is the person who runs Enron's trading operation out of Portland, Oregon.

CHAIRMAN DUNN: If I can ask one question.

When was this conference you're referring to?

MR. KAHN: This was in March, in Santa Fe, a conference sponsored by New Mexico State University.

SENATOR MORROW: What was the gentleman's name?

MR. KAHN: His name is Tim Belden, B-e-l-d-e-n.

I think there was also -- now, I recall another Enron document, I cannot remember where it was filed, which also contained some criticisms of our report as well, similar in substance to the Hogan document.

SENATOR MORROW: You've seen that document or that report?

MR. KAHN: Yes, it was a piece of testimony filed by Enron in some FERC proceeding or other. I could probably produce it and get you the reference.

SENATOR MORROW: If that wouldn't be too much trouble, it might make life easier for us.

MR. KAHN: Sure, sure.

SENATOR MORROW: Thank you.

CHAIRMAN DUNN: Ronda, you're already making note of that.

Mr. Kahn, I've got a few questions, again, wandering through your report in no particular order.

Donna, if we could go to Page 5. It has on the top half a graph. I want to highlight that paragraph that begins right under the graph that starts with: "Until 1998 and 1999," Page 5 of Mr. Kahn's report. That's the one.

Do you see where we are?

MR. KAHN: Yes.

CHAIRMAN DUNN: It says, just the first sentence or two:

> "Until 1998 and 1999, the 18,000 Mw of gas-fired capacity in the CAISO's control area was owned by the three vertically integrated IOUs."

And of course it goes on say under the restructuring program, these were sold off primarily to five out-of-state companies, et

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cetera, et cetera, et cetera.

Have you looked at the impact of how those sales settled into approximately five companies? How that impacted the potential for market power in California?

MR. KAHN: I have made no specific study. And it's, I think, common sense and professional trade wisdom that the larger the portfolio, the greater the ability of a generator to exercise market power.

So, if this 18,000 megawatts would have been sold off to 10 or 15 firms, we might have seen less exercise of market power.

On the other hand, when you're in a shortage situation, everybody has market power. And so, if we had a less -- and by standard measures, the new generation owners do not have large shares of the market. The largest of these has less than 10 percent. So, that by standard measures, this is not excessive concentration.

When you're in a shortage situation, then everybody is king.

CHAIRMAN DUNN: And as you're probably well aware, we'll be talking extensively with Professor Borenstein about the concentration model and its effectiveness under this scenario.

MR. KAHN: Yes.

CHAIRMAN DUNN: The question I had, and again, if I'm outside of your area, please tell me. It's just a curious thing, at least to this individual, that the way those sales occurred and settled into primarily the hands of five

generators, at a price that was -- collective price for all those units -- far above what most analysts felt those sales would actually go for -- would indicate there was something about those purchases that was attractive that some were not noticing at the time those sales occurred.

Are you familiar with that whole process and how it unfolded?

MR. KAHN: I'm familiar with the history. I was not -- I have had no involvement in the actual process.

I have looked at the general market for divested power plants.

CHAIRMAN DUNN: But not familiar sufficiently with these? Again, that's why I don't want to drag you into an area that's outside --

MR. KAHN: No, I'm not sure I have much that would be particularly enlightening on this subject.

CHAIRMAN DUNN: Not a problem.

Senator Morrow.

SENATOR MORROW: Thank you, Mr. Chairman.

Quick question again for clarification.

I thought I had read your report. I've read a report that was dated November 21st, 2000.

MR. KAHN: No. There is a slight confusion here.

We have two different versions. The November 21st version was the version filed by Edison at FERC.

The January 15 version is slightly revised. None of the revisions involve any of the quantitative material. They mostly involve just the framing of the problem.

SENATOR MORROW: So, there's no appreciable difference between the two reports?

MR. KAHN: There is a table in the January report which compares an Energy Commission forecast of the year 2000 prices with the actual outcome, to demonstrate that the price run-up was unanticipated. Therefore, the table numbering in the two versions differs by one, because this table was not in the November 21st, the one you're looking at, but was in the January 15 version.

SENATOR MORROW: Okay, thank you.

MR. KAHN: And the figure also wasn't in the

November 21.

CHAIRMAN DUNN: Donna, if we could go to Page 6. Middle of that page there's a paragraph that begins, "It is particularly important ..." A few lines down you'll see a sentence that begins on the far left side, "Moreover," and then the rest of that paragraph.

Do you see where we are?

MR. KAHN: Yes.

CHAIRMAN DUNN: In this particular section, you're describing how there was a predetermined retail price of roughly $60 per megawatt hour. Without reading the whole thing, the expectation was that as deregulation moved forward, the wholesale prices would drop dramatically, and thus, the consumers benefit, residential and commercial.

But you end that with: "The year 2000 led to some surprises on this front."

I assume by that phrase you're referring to the

fact that wholesale prices did not fall as one had assumed they would when this process was commenced in approximately 1996?

MR. KAHN: That's correct.

CHAIRMAN DUNN: Did you look at the studies and analyses that were done in and around the '96 time period to determine whether anybody was predicting that this deregulation route that we were embarking on may in fact not lead to the expected results?

MR. KAHN: I did some of them. And I did a study which -- essentially, we simulated the western market under the assumption of competitive behavior, and found, not surprisingly, competitive prices.

Colleagues of mine at the time, including Professor Borenstein, did studies assuming oligopoly behavior, and they found substantially higher prices than others had expected.

Perhaps Professor Borenstein could discuss that study of his at greater length. I think it is fair to say that it was not accepted at the time as an important forecast of what was likely to occur.

CHAIRMAN DUNN: Fair to conclude -- and again, we're going to spend some time with Professor Borenstein about that very issue -- that if, in fact, there was truly a competitive market, we would have seen what was expected at the time this process was commenced.

MR. KAHN: Subject to one issue which had to do with gas prices. Even under competitive conditions, if gas prices rise, then the electricity price will rise with them

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since the marginal price is always set by gas in California.

The expectations at the time were for low or moderate gas prices. And if my memory serves me, even Professor Borenstein's oligopoly study also assumed the same sort of 2-3 dollars a million btu. It did not assume 5, or 10, or 15 dollars a million btu.

So, I think that's the main caveat.

CHAIRMAN DUNN: But even with that caveat, as you've testified today, that we build in the higher gas prices, at least in your assessment, does not explain the prices we find on the wholesale market in California in a competitive model?

MR. KAHN: In a competitive model, right. Fair enough.

CHAIRMAN DUNN: Let's go to Page 9, Donna, and I want to go to Footnote Number 9.

We've had some testimony, but I want to make sure we're all under the understanding of what you're referring to. In the middle of that paragraph, Mr. Kahn, it says:

"During emergency situations,
it was widely known that the ISO
would pay more than the price cap
for supplies and this probably had
the effect of creating more
emergencies as generators withheld
scheduling supplies day-ahead or
hour-ahead in the hope of getting
higher prices from the ISO through
a last-minute out-of-market sale."

Could you explain that in lay terms?

MR. KAHN: I'll try.

CHAIRMAN DUNN: If possible.

MR. KAHN: One simple way to say this is, that if you've got market power, you've got market power, and it's pretty hard to suppress it.

By introducing price caps, we, or the regulators, attempted to limit the ability of generators to raise price. But when you're in a shortage situation, then meeting demand is going to be the ISO's primary objective. And they found themselves in a situation of either not meeting demand if they observed their price cap, or meeting demand if they would pay suppliers prices above the price cap. That was the so-called out-of-market calls.

And generators, once they figured out that the ISO would make out-of-market payments, just found ways to make their generation out-of-market, and thereby evade the price caps.

This is only going to work when the ISO is up against the wall, so to speak.

CHAIRMAN DUNN: Have you done any analysis on that particular phenomenon?

MR. KAHN: No.

CHAIRMAN DUNN: Who has, to your knowledge?

MR. KAHN: I couldn't give you a specific reference. This is related to a phenomenon that's sometimes called megawatt laundering, the idea being that if the ISO is only making out-of-market payments to generation coming from out

of the ISO control area, well then, what you do is, you export your generation out of the ISO control area and bring it back in as an import and get an out-of-market payment. That's a process known as megawatt laundering.

This is mentioned in the various reports to some degree or other. I have not personally studied it yet.

CHAIRMAN DUNN: Are you aware of any study that's under way examining the megawatt laundering issue?

MR. KAHN: I can say that it's on my agenda.

CHAIRMAN DUNN: Besides yourself, Mr. Kahn?

MR. KAHN: I'm sure there are plenty of others, but I do not know names.

SENATOR JOHANNESSEN: Mr. Chairman, I'm very interested in that because that plays into the intent at the time of the deregulation, and the intent on how the selling of the properties took place.

CHAIRMAN DUNN: Very true.

I just have a couple questions left, Mr. Kahn, in your report.

Just for clarification, Page 15, Donna. I'm in the first paragraph, Mr. Kahn, of that page. It's actually a continuation from age 14. The last two sentences of the paragraph read as follows:

"We believe that the estimated price gap is large enough to provide credible evidence that market power or other market imperfections lead to a

significant increase in prices above competitive levels during summer 2000. At the very least, this finding makes it clear that additional analysis of generator and marketer behavior based on data which are not now available to us is warranted."

If you could kind of make a wish list of the data that you would like to have available to you, whether confidential, not confidential, regardless of source, what other data would you believe is important to doing analysis?

MR. KAHN: I've lived so long in the unavailable world that it's hard to articulate absolutely everything that one would like.

Certainly, we have no access to bid data at all. So, we don't know how any of the generators bid.

We have no access to their ancillary services awards. That would be very useful.

I suppose I should have such a long list, but I'm afraid that the enormity of what's out there, compared to what we have, is large.

I guess the other item that really needs to be addressed is dispatch and maintenance logs, because so much of the story that the generators tell about not supplying involves the claim that units were unavailable, or had outages, or needed maintenance.

It's my belief that we ultimately need to examine

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those questions, and independent engineers are going to be required for that. Because outages and maintenance involve lots of judgments, and lots of economic trade-offs. And although economists can help, it's going to be extremely important to have knowledgeable engineers who can discuss the types of standard behavior to deal with certain maintenance and outage problems that routinely occur. And to compare what these generators did in these situations with what would be standard or prudent industry practice.

CHAIRMAN DUNN: We have had earlier testimonies from some of our witnesses on that particular issue. And I believe it was Professor Wolak who referred to this process as a little bit like the employee who calls in sick, claiming that their stomach is upset. It's difficult to prove or disprove whether that, in fact, occurred.

Have you done any consideration of how one might be able to examine whether claimed outages truly are -- I hesitate to use the word, but I'll do it anyway -- legitimate?

MR. KAHN: This is extremely difficult. Absent what you might call smoking gun evidence that some operator writes down in a log -- "The trader made me take the unit off line and claim that it had an operating problem" -- if you don't have that kind of thing, then you are going to get into a sort of battle of engineering judgments. And I'm afraid that a certain amount of this is going to be inevitable.

A criticism made of people in my profession, for example, is that if you give a task to someone who's paid an hourly rate, he does it very slowly.

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And so, that's what we might find with regard to the maintenance practices.

Yes, there were legitimate maintenance needs. Did they perform their work in a timely fashion? Did they take twice as long to do it as anyone else would have taken to do it? Those are the kinds of questions that you're going to have to ask.

There are even more difficult questions, which is, did they operate the plants in such a way as to require more maintenance? There have been allegations in the press that the plants were operated in an imprudent fashion that would increase the wear and tear.

One can compare, for example, how the plants were operated by their previous owners with how they were operated the new owners and get some measure of whether the operation was imprudent to the point of causing them to break down.

But even if you had that, then you could get into an argument with the generators where they would say, "Well, my economic optimization said I should run the plant into the ground because that's profit maximizing, and I'm going to replace it with a new, efficient plant at some later date. And if I ran it in a more prudent fashion, which wouldn't have run it into the ground, well, I wouldn't have made as much money, and the plant would have lasted longer, and therefore, I wouldn't have brought the new capacity into the market sooner."

So these are going to be very difficult arguments.

CHAIRMAN DUNN: Help me with one process,

though. That is, let's take the view temporarily here of the hardened cynic that would say, as some press reports have said, that this is all a manipulation of the system. We've all read those articles along the way.

For that to be true, the plant outages would have to be timed to when it would maximize its positive impact for a hypothetical generator on the market.

Where within a hypothetical generator would that knowledge rest? Certainly it wouldn't rest with the plant manager of a given unit. It would rest somewhere else within the generator world.

MR. KAHN: In the trading operation.

CHAIRMAN DUNN: So that if we watched, and looked, and searched, and investigated the potential communication link between the trading operation and the particular plants, that might be an area where we would be able to see if, in fact, there might be evidence of that kind of plant outages for purposes of impacting the trading world behavior?

MR. KAHN: And we hope to assist you by identifying some particular events and circumstances which would be worthy of such investigation.

CHAIRMAN DUNN: All right.

SENATOR JOHANNESSEN: Mr. Chairman.

CHAIRMAN DUNN: Senator Johannessen.

SENATOR JOHANNESSEN: It seems to me, because this was part of my job in the old days, that there is a trail, record, written trail. Because usually what happened, at least

I would assume -- unless there are some very, very small operators that may just run it into the ground; they want to get some new equipment, and new, more efficient generators, whatever it happened to be -- that there are several years of operation. These pieces of equipment last several years, obviously, and they have a maintenance record.

That maintenance record would pretty much indicate what, if anything, goes wrong during that period of time: What was cause and what was done with it.

And that record should be available unless it disappears. And in the event of some disaster happening with the equipment, of course, that cannot be foreseen in any given time anyway, but that also will be probably well noted.

Generally speaking, the information comes from the plant manager or for the one responsible for the equipment in the small area, and it flows up to the owners or manager, the main people involved in the operation, which in turn make the decision whether or not the expense is going to have to be made in order to do this. That is a record.

It is also a maintenance record for these pieces of equipment. I would find it very unlikely that it will not be a continued maintenance record on these pieces of equipment. They're too expensive not to. And that can then be followed, because someone had to, number one, request; and someone to approve; and then a time set for the purposes of making the repair. Or, if any risk was going to be taken, whether or not you run it into the ground or not. I mean, I suppose that's a possibility, but not very likely.

And then, when the repairs are made, whoever made those repairs would also have to make a report of what the findings were, because that is important information as to potential future damage to the equipment, because you need this record.

All of these things are available, and I would love to see all these records, because I find it totally unreasonable that these records will not be available.

MR. KAHN: I would certainly agree that no reasonable business of this type could be conducted without these kinds of records.

I think, assuming that, one way or another, this committee or other investigators are able obtain these records, it will still take a lot of time to go through them and make inferences about whether the behavior was questionable or acceptable.

CHAIRMAN DUNN: Just a couple more questions. Page 18, the very last two lines that begin with, "We begin." It spills over to next page.

I just have one quick question here. At the very bottom of Page 18 it says:

> "We begin by outlining simply
> the profit maximization logic
> behind capacity withdrawal and
> show that rational capacity
> withholding does not require
> collusion among suppliers. We
> consider the unilateral case ..."

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I know we've already spoken about this in your presentation of this.

Do you know of anyone that either has looked at or is currently look at examining, investigating, studying the issue of potential withholding via collusive or collaborative efforts between market participants?

MR. KAHN: I'm sure that people are looking at it, just as I'm sure that the moon goes around the earth, but that doesn't mean I have direct and intimate personal knowledge of that.

CHAIRMAN DUNN: You are not aware personally of any study underway?

MR. KAHN: No.

CHAIRMAN DUNN: And you have not looked at that collusion/collaborative effort side of it?

MR. KAHN: Not yet.

CHAIRMAN DUNN: On your agenda, is it?

MR. KAHN: Yes.

CHAIRMAN DUNN: You mentioned before, in finishing up with an earlier question, that there may be circumstances that you may highlight about when I was asking the question about communication via trading to a particular unit.

Is this something that may be addressed in your upcoming report?

MR. KAHN: Our upcoming report essentially revisits the previous work in more detail, and with a more transparent and comprehensive assessment, particularly of the month of June. And we expect that we will come to a conclusion

similar to those that we have previously come to, but with a sharper focus, and raising particular questions about particular events.

CHAIRMAN DUNN: All right. My last few questions.

In coming to the end of your particular report, you set out your Conclusions on Page 30.

Given that this was published about five months ago or so, in January, any significance changes in your conclusions, alterations in your conclusions that were reached here?

MR. KAHN: No.

CHAIRMAN DUNN: And you've already talked about the further work. You're expecting to publish a follow-up report here relatively shortly?

MR. KAHN: Yes.

CHAIRMAN DUNN: Any other reports that you anticipate publishing in the near future?

MR. KAHN: In my business, you don't publish a lot.

CHAIRMAN DUNN: That's a no, I take it?

MR. KAHN: That's right. One never knows.

CHAIRMAN DUNN: I understand. I know that in your world, it could change very quickly, depending upon the circumstances and so forth.

The last question that I have for you is, I'll make some representations to you, Mr. Kahn, and just accept them for purposes of this question for right now.

In one of our earlier hearings, a representative of a trade organization handed out a list of eleven investigations that it appears that they're trying to use to say it clears the names of the generators in any conduct that may or may not have occurred in the wholesale electricity market.

Lucky you, you're on the list of eleven investigations that fall into this category.

Is it fair to characterize the work that you've done as clearing the name of any of the market participants as far as anti-competitive behavior on that wholesale electricity market?

MR. KAHN: Well, I think it's fair to say that the results that I discussed earlier this afternoon raise pointed questions about some participants; put us in a situation where we can make no inferences about other participants.

The one participant that comes out of our studies with a relatively clean bill of health is Duke. If you review the tables that I presented, you will see that they produced the most relative to their capacity of all the generators.

So by those measures, Duke's performance is qualitatively more competitive than those of the other generators.

CHAIRMAN DUNN: And that's about the best that can be concluded thus far?

MR. KAHN: Right, and who knows what you'll find tomorrow.

CHAIRMAN DUNN: I understand, including your next report.

Any other questions for Mr. Kahn?

MR. DRIVON: Mr. Kahn, Table 10 and Table 12 of your report have been cited as clearing the generators of withholding.

Is that a fair interpretation of those tables?

MR. KAHN: Table 10, and particularly what's referred to there as Test 1, is widely discussed in the Hogan paper, and, we believe, widely misinterpreted.

So, I think -- I would put the Hogan paper in the category of those who would allege that Table 10 clears the generators.

We hope that the document that we will be producing shortly will eliminate that perception.

MR. DRIVON: So, from your perspective as the author, it would not be a fair interpretation of the data to say that that table clears them of withholding?

MR. KAHN: We understand how some people who want to come to that conclusion can come to that conclusion using this table. And I think some of the responsibility for the confusion lies with our poor choice of some terminology. We will be apologizing for that choice of terminology in our coming paper.

Turn to Table 12. Table 12, which uses the EHV data as opposed to the CEMS data, which is used in Table 10, was not addressed at all in the Hogan and Harvey report. To the extent that we consider the Hogan and Harvey report to be the only semi-serious discussion of our work, they did not address Table 12.

MR. DRIVON: On a different subject, and this is the last couple of questions that I have, you did not look in your study at the question of whether or not NOx trading has been used to manipulate the market, did you?

MR. KAHN: That's correct.

MR. DRIVON: Do you have an understanding of whether or not NOx credit trading can potentially be used in that way?

MR. KAHN: It's my understanding that it could potentially be used in that way.

MR. DRIVON: Has anyone that you know of studied that point?

MR. KAHN: There is an academic paper about the manipulation of pollution permit markets, which is a theory paper and does not address any specific institutions.

MR. DRIVON: That's all. Thank you.

CHAIRMAN DUNN: Anything else, Senator Johannessen?

SENATOR JOHANNESSEN: No. I assume we can get the information we're looking for. I'd like to have it in my hands.

CHAIRMAN DUNN: Mr. Kahn, thank you very, very much. We brought it to the end. Hopefully we didn't take you too long here today.

What we're going to do now for everybody is, Evelyn, I think we're about at the hour-and-a-half timeframe. We're going to take ten minutes, and then come back to our second and last witness for the day. So, about a ten-minute

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recess.

[Thereupon a brief recess was taken.]

CHAIRMAN DUNN: I think we're about ready to begin. Professor, I'm assuming you're ready?

DR. BORENSTEIN: I'm more than ready.

CHAIRMAN DUNN: Yes, let's get this over and done with.

JudyAnne, do your duty.

MS. McGINLEY: Will the witness please stand. Please state your name for the record.

DR. BORENSTEIN: Severin Borenstein.

MS. McGINLEY: Please raise your right hand.

[Thereupon the witness, SEVERIN BORENSTEIN, swore to tell the truth, the whole truth, and nothing but the truth.]

CHAIRMAN DUNN: Protocol, do you prefer Professor, Doctor, Mister?

DR. BORENSTEIN: Severin.

CHAIRMAN DUNN: I would like to comply with that, but we tend to be more formal here. Is Professor okay?

DR. BORENSTEIN: Professor is fine.

CHAIRMAN DUNN: You've got it. That's what we will do.

Professor, thank you very, very much for being with us today. We will try to make it as short as possible.

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As you're probably aware, we unfortunately had Professor Wolak here until well into the evening, but each hearing has gotten progressively shorter, and hopefully, we can do that as well.

Professor, if you don't mind, could you just give us, real quickly, a little background about yourself and how you've become involved, whether willingly or reluctantly, in examining the California energy crisis?

DR. BORENSTEIN: I am Professor at the Haas School of Business at UC Berkeley, and Director of the University of California Energy Institute. I became Director of the UC Energy Institute in 1994.

I actually became Director based on work I had done in the oil and gasoline markets, but just a few months after I became Director, I was asked to come to Sacramento and testify on the idea of electricity deregulation. I did have some background. I had taught in the area, and I had done a bit of research.

That -- the beginning of the process, in '94 and '95, caused me to start thinking about how deregulated electricity markets would work, and in the process, to write a number of papers, most of them with Jim Bushnell, a colleague of mine at the UC Energy Institute, also at least one with Frank Wolak, and a number of other people. And one, in fact, with Ed Kahn, the previous witness.

In the process, in '96, the '96-'97 period, I wrote or co-authored a number of papers that pointed out the potential for the exercise of market power in deregulated

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electricity markets, some that were referred to earlier today.

And particularly, pointed out that in the California market, a deregulated market, depending on the structure and the ownership of generation, could have very adverse effects in terms of high prices from the exercise of the market power.

Since then, in 1997, I was appointed to be a member of the Governing Board of the California Power Exchange, and continue to serve on that Governing Board, though the Power Exchange is in bankruptcy and is about to cease operations. And in the process, became very familiar with some of the inside workings of the deregulated market as well as continuing to do research.

I have written a number of papers, spoken at various conferences, industry groups, et cetera, and have tried to, as the crisis has worsened, become more and more active and vocal to move policy in the direction that I think would be helpful to the citizens of California.

CHAIRMAN DUNN: Many of your papers are published under the title "POWER". Can you explain what that is?

DR. BORENSTEIN: "POWER" is the program on workable energy regulation. It's an acronym that predates my affiliation with the UC Energy Institute. I am not responsible for it. Some people think it's clever. I think it's sort of an albatross, but there you go.

Under "POWER" we have a working paper series, that the work that comes out of the UC Energy Institute, the policy work that comes out of the UC Energy Institute, is released as "POWER" working papers. Most of those papers have

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since been published in refereed academic journals, but they come out first as "POWER" working papers.

CHAIRMAN DUNN: As you mentioned in your comments, I know that you have published a number through the years of the papers that began under the "POWER" label, and subsequently were published in other journals.

I'm prepared to walk you through at least some of the key areas each of those papers. If you would prefer to walk us through --

DR. BORENSTEIN: Well, I guess I would like to start out making a couple of statements.

I am here today because I am very concerned about the exercise of market power in California electricity markets. I think I have a pretty long track record of being very concerned about it.

But I do a want to say that, although I support the work of this committee, I am very concerned that the emphasis in Sacramento is turning almost exclusively to the concerns about market power, to the detriment of concerns about conservation.

It is May 31st. Regardless of what happens, in three weeks it will be summer. And we are on a track right now to have a large number of blackouts because we won't be conserving sufficiently.

And also because we won't be conserving aggressively, we're going to have extremely high prices in the wholesale market.

As the papers I've pointed out -- I've written

point out, when you get into a very tight market, prices go through the roof, to some extent for legitimate supply-demand reasons, and to some extent because firms are able to exercise market power.

While I have real concerns about the exercise of market power, I think that there is, at this point, no luxury of wasting time. And I am concerned that Sacramento continues to focus on this to the exclusion of focusing on the real things we can do, without any help from the federal government, to conserve to get through this summer with the minimum of disruption that would greatly reduce the chance of driving the state into a severe economic recession, which is where I think we are going right now.

SENATOR JOHANNESSEN: Mr. Chairman, this obviously is dear to all our hearts, what he is talking about.

The question that I would have, it's easy to say, well we're not doing enough here in conservation and so forth. I appreciate that, Professor, but if you would somehow enlighten me as to what you feel we ought to be doing that we are not already doing, both through legislation and to action that we have taken?

DR. BORENSTEIN: Well, I'd be happy to.

CHAIRMAN DUNN: Before you start, I'll give you a chance to --

DR. BORENSTEIN: You don't want me to spend much time on this, do you?

CHAIRMAN DUNN: You've got it.

Just so you understand, Professor --

DR. BORENSTEIN: I do understand that.

CHAIRMAN DUNN: The reason for that is because, obviously, the focus.

I think your comments generally here for our work and the Legislature as a whole, I don't think anybody would disagree with.

This particular committee is solely zeroed in on the investigation, so that you understand that.

DR. BORENSTEIN: And I don't intend to spend long on this.

It is 90-plus degrees in Sacramento today. We're in a Stage Two or Stage Three emergency, and the temperature in this room is in the low 70s. I am wearing short sleeves and no tie because every time I come to Sacramento, I anticipate that the Legislature will get it and will change the temperature, and every time I'm wrong.

Senator Bowen seems to be going in the right direction, taking a more casual approach, and I appreciate that.

CHAIRMAN DUNN: I think her dress may be a little for different reasons today, which we have not asked her about yet.

DR. BORENSTEIN: But I think one thing that the Legislature and Governor should be doing is through leading by example, by changing air conditioning settings and changing dress codes.

We could comfortably, and we do comfortably operate at the UC Energy Institute, which is an old metal

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building with no insulation, where it was yesterday in my office 92 degrees, which wasn't comfortable, I'll admit.

But on the other hand, I was wearing shorts and a short-sleeved shirt.

SENATOR JOHANNESSEN: I can see us doing that, all right.

DR. BORENSTEIN: Well, I think it's time to actually take seriously the emergency that we are facing.

If the only thing we found was that we saw the legs of Legislators this summer, that would be a big win.

SENATOR BOWEN: For some of us, it's not a change.

DR. BORENSTEIN: Although that's due to the norms.

And I think a push for real-time pricing of electricity, which does not mean necessarily exactly copying the wholesale prices, but it means letting prices vary and passing those through the retail level where possible. This summer, it's only possible with the very largest loads. I don't understand the full political process. There is tremendous resistance to that on a number of levels by the large industrial consumers, from the PUC, from a number of other constituencies. They have in some cases valid concerns, but we were facing an emergency this summer.

Failure to take these actions to do possibly painful, certainly a bit disruptive conservation is going to instead lead us to extremely painful and extremely disruptive conservation through blackouts.

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And I just wanted to preface the discussion today by saying that we really need to have more emphasis there. Summer is coming. Although, I hope we will eventually get some action out of the FERC, I don't anticipate we're going to get it any time soon.

CHAIRMAN DUNN: Understood.

SENATOR BOWEN: I'd like to continue this conservation again in the next week or two. I know we're running out of time.

I share your concern about the temperature. You'll find there's some offices in the building that do have their thermostats up.

But it's typical. It happens all the time in business establishments. You walk in, and you find that they've reduced their lighting, which is nice, because that's eleven percent of peak load, but you still need a sweater to go grocery shopping.

So, we do have a lot of work to do.

DR. BORENSTEIN: And frankly, at this point, I think, given that it's May 31st, it is time for command and control intervention. It's time to pass laws that say -- or to have emergency orders that say companies cannot keep their thermostats below 78 degrees between 11:00 A.M. and 7:00 P.M.

And boy, that is not the right way to do it. It's just a whole lot better than having blackouts.

It's really ridiculous to have days on which there are companies having millions of dollars' production destroyed by blackouts, while there are other companies that

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have their air conditioning set at 72 degrees.

SENATOR BOWEN: Or 68.

DR. BORENSTEIN: Or 68.

And the red herring that is often raised, that the computers need it, is a red herring. It's true for main frames and older main frames. It is not true for PCs. And older main frames almost always have a separate air conditioning unit.

So with that, I would be happy to now talk about market power.

CHAIRMAN DUNN: Understood.

Senator Bowen, did you have anything further?

SENATOR BOWEN: No, other than I think we will find a time soon to continue the conversation, and to ask the Energy Commission and the PUC where they are with their real-time metering projects for this summer, and to again discuss going to a short-sleeved standard in this building for the summer, which would afford us --

DR. BORENSTEIN: I would feel a lot less out of place if you would do that.

CHAIRMAN DUNN: Professor, let's begin. I want to quickly touch upon each of the reports, starting in March of '96. Some I want to spend a little more time on, some a little less time on. But I do want to touch upon them because, at least in my view, I'll editorialize for a minute, it's fascinating reading, going through each of your reports, from what was assumed would occur at kind of the beginning of these markets, and where we find ourselves now, as you track them

through your reports. At least for this person, I found it to be fascinating.

I know there may be some who disagree with some of your conclusions and so forth, but it was interesting to trace them all the way through.

I want to begin with the March 18th, 1996 report, which is entitled, "Market Power in California Electricity Markets," which you did co-author with several of the others that you have indicated from before.

I take it, you're familiar with the report I'm referring to?

DR. BORENSTEIN: Although I haven't read it in a number of years, but yes. Actually, I was the principal author of the section on the exercise of market power.

CHAIRMAN DUNN: Which is the section actually I'm probably going to spend the most time on.

Can you give us a little background? What led up to this report? Why was it published in the first place? What gave rise to it?

DR. BORENSTEIN: Well, there was a lot -- after my testimony in 1994, which, by the way, mainly focused on pointing out that deregulation wasn't going to make stranded costs go away, that somebody had to pay for them, and this wasn't a silver bullet. It just would reallocate them, potentially.

A number of us at the Energy Institute started discussing, well, how are these markets going to work? And recognized that we face some real challenges in electricity

markets because of the lack of demand responsiveness, what economists call demand elasticity.

As a result of the lack of demand responsiveness, we could end up with very high prices, even if the market was not particularly concentrated.

At the same time, the Federal Energy Regulatory Commission was beginning to do analysis of the potential competitiveness, using the Department of the Justice's merger guideline standards for market share to determine whether the market would be competitive.

CHAIRMAN DUNN: Can you briefly describe what those guidelines looked like?

DR. BORENSTEIN: The guidelines say, use what's called a Herfendahl Index, which is the sum of the squared market shares of all players, of all firms in the market. And it says that below a certain level, everything's okay. In a mid-range, you've got to be concerned, but it's an open question. And above that range, the likelihood is a merger or a market of that sort would exhibit market power.

The guidelines as published by the DOJ and FTC are very clear in stating that these are only guidelines. That they're only starting points, that one must take into account specific factors of every industry, blah, blah, blah.

The FERC completely ignored those, that part, and mindlessly applied these standards to electricity markets. So they did, and to my understanding, still do consider a firm with even as much as 18 percent of the capacity in a market to be unable to exercise market power.

Now, this is ridiculous. We know perfectly well that with no demand elasticity, on a hot summer day, when the ISO needs 95 percent of all capacity running to meet the load, and you have 18 percent of the capacity, the ISO is going to have to have major blackouts without you.

So, we started thinking about, you know, what's wrong with this standard. And part of the paper -- there are many parts to that paper. There's a section on ancillary services -- part of the paper points out that the use of traditional merger guidelines in general has to be mitigated by an understanding of how the demand -- how price responsive the demand is; how competition operates; what the supply constraints are, and so forth.

And specifically in the electricity industry, that is likely to -- that will lead you to a conclusion that a much smaller market share would still permit a firm to unilaterally exercise market power.

CHAIRMAN DUNN: And we're going to get to the discussion, which I know is one of the later papers, about the concentration approach, which is what you basically described, and how it may not be the correct analysis for this particular market.

Is that a fair statement?

DR. BORENSTEIN: It is not the correct analysis. It is a virtually useless analysis.

CHAIRMAN DUNN: Okay, I was being a little overly cautious in my comments, but we will get to that.

Some of the questions I have actually from the paper you've already just touched upon. Let me go to page, it's actually 0047 on yours, Donna, and it's page 9 of your report. I know you don't have it in front of you, Professor, and we will bring it up. But which is the page where it starts the Market Power Analysis, which, as I understand, was the one you were most involved in throughout this process.

You don't have to highlight it, Donna. The very last sentence of the first paragraph reads:

"Thus, the measurement of the
market power of sellers should
begin with some measure of
concentration, but it must
proceed well beyond that point."

That's exactly what you were referring to?

DR. BORENSTEIN: That's right.

CHAIRMAN DUNN: Great.

The next paragraph, the last two sentences read: "If a Distco," and that's --

DR. BORENSTEIN: That's distribution company.

CHAIRMAN DUNN: "... can automatically
adjust retail prices to pass
through any wholesale exchange
price fluctuations, then there is
little incentive for it to
take actions that could lower
wholesale electricity prices."

Next sentence:

"If the Distco were under

a price cap without an
adjustment for wholesale prices,

however, the firm could have a strong incentive to encourage lower wholesale prices."

Could you explain what you're talking about there?

DR. BORENSTEIN: Actually, this winter was a fabulous example of what we're talking about here, but in the natural gas market.

The way natural gas is regulated in California, the regulated utilities are compensated for the gas that they sell based on the current spot price. Essentially, if they buy on a long-term contract, they bear all the risk, or a substantial portion of the risk, from the price fluctuating.

So their response is to simply buy everything on the spot market, to not do anything to increase their risk.

Well, in that case, they have no incentive to go -- they have very small incentive to out and try to find a better deal, because they're going to bear all the risk of it,

Here, if the utilities were somebody passing through whatever price they pay for electricity on to consumers, they would be virtually indifferent to the price.

Now, they will say, "No, that's not true. We care very much about the our consumers," and I think they do. But they also care very much about their shareholders, and under the law, they're supposed to be caring mostly about their shareholders. So, their incentives as far as their shareholders

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would be concerned would be to figure out other ways to make money, but not to really spend a lot of time or effort trying to figure out how to get the cheapest possible price for electricity.

CHAIRMAN DUNN: The next sentence talks about a different scenario under a price cap.

DR. BORENSTEIN: Under a price cap, and this is sort of the extreme case. I should point out, this was not advocating a price cap. This was just pointing out the incentives.

That under a pure price cap, the Distco would simply be told, you can sell power for X cents per kilowatt hour. You go out and procure it for whatever price you can, and you get to keep the difference.

That is not, by the way, an accurate portrayal of what we actually ended up with, because the competition transition charge was much more complicated than that.

In that case, the utility would have quite a strong incentive to procure power at low prices.

CHAIRMAN DUNN: You continue on in this page later on, you talk about the vertical integration, which under the AB 1890, or at least it's been alleged to be connected there, one of the aspects was to address the vertical integration.

I know what was advocated at this time period. That is, that there shouldn't be vertical integration.

In hindsight, do you still agree that vertical integration was something that should not exist within that

market?

DR. BORENSTEIN: Well, actually I haven't read this paper in a long time, but I'm not sure we actually said there should be no vertical integration. Perhaps we did.

But what we were referring to was the problem that a firm in a -- that has generation, if that generation is not in a -- or if they have generation that's not regulated, and yet they control the grid, they'll have an incentive to favor their generation over other generation, which is going to be a general conflict of interest between a firm that owns generation and owns transmission.

There was a long history prior to 1996 of complaints about the regulated utilities doing exactly this, even when their generation was regulated, of using the transmission grid to discourage independent power producers.

I don't know. I never looked into the truthfulness of those accusations, but at least there was significant concern about it.

CHAIRMAN DUNN: I want to jump forward to, Donna, you have it as 0057. It's Section 3.4, "Collusion and the Bidding Process," Professor.

We've touched upon this with some previous witnesses. I want to go to highlight the very last paragraph, Donna, that begins, "It is possible." It reads:

> "It is possible that some unusual characteristics of the electricity spot market may lend themselves to collusive practices.

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> The strategic actions of most firms will be fairly transparent, although many aspects of the bid process pertinent to the question of collusion, such as what bid information is made publicly available, have yet to be established. Spot market auctions will be repeated frequently and this could provide opportunities to punish firms who deviate from

collusive equilibria."

Can you explain that in lay terms?

DR. BORENSTEIN: I'll try.

The notion of what's called tacit collusion -- let me first talk about -- collusion is illegal under federal anti-trust laws. Firms are not allowed -- the firms that compete with one another are not allowed to get together and make agreements to reduce competition, whether by raising price, dividing up markets, setting various standards, whatever.

Everyone understands that it is illegal for a bunch of firms to sit down in a room, smoke-filled or otherwise, and agree on prices.

A more subtle form of cooperation or reduction of competition can occur if firms interact frequently, and through that interaction are able to send signals, or engage in patterns of behavior that make it clear that they will respond to less cooperative behavior through some process of punishing the firm

that doesn't cooperate.

I was the economic expert for the U.S. Department of Justice in their lawsuit against the airline industry and the airline tariff publishing company in the early '90s -- that's just probably the most famous tacit collusion case -- in which the airlines were putting up -- well, what they would do is, they would pre-announce an intention to raise their price, and then wait to see if other airlines also pre-announced the intention to raise the same price on the same day to the same amount. And then if that occurred, they would go ahead. And if some airline didn't go along, it would unfold, it would unwind, and the result would be, they wouldn't implement the price increase.

That sort of repeated interaction which took place in the airline industry through the -- through the booking systems, which could take place in the electricity industry through the bidding process, could potentially lead to patterns of behavior that allow firms to make it clear that they will cooperate, they will be less competitive, so long as other firms are less competitive. And on the other side, that if another firm bids more competitively, they will attempt to punish that firm by bidding very aggressively against them.

The electricity industry, we were pointing out here, seems to have a real problem, in that they are -- these are very frequently repeated interactions.

Now, there are other factors that make it probably even more difficult to engage in tacit collusion in the electricity markets, one potentially being that the demand

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fluctuates a lot. On the other hand, the demand is not price responsive, which makes it easier. There are a lot of factors.

This was pointing out that we were at least concerned about that.

CHAIRMAN DUNN: That's what I was going to say, that in your '96 paper, the fact that you're raising this is saying basically, with the creation of these new markets, we need to watch out for this because there are some factors that would lend to a potential tacit collusion situation?

DR. BORENSTEIN: Yes.

CHAIRMAN DUNN: Senator Bowen.

SENATOR BOWEN: I'm trying to think which door to open first, because there are so many that are potentially interesting.

Can you talk about the impacts of the Power Exchange on this, because that's a market where you didn't get to see who the bidder was.

DR. BORENSTEIN: Yeah. From the very beginning of the Power Exchange, there was debate about how much should be made public about bidding. And the tension that occurred was a tension between, on good public policy grounds, people who argued you should not make the data public because the bidders could then use these data to actually track what one another are doing and engage in tacit collusion.

The opposing view was that by making data public, you allow outside researchers to investigate the data and to find if there are patterns that would indicate tacit collusion.

The decision the Power Exchange finally came to,

actually, it was well after the Exchange started operating, was to release the data, but to do it with a very long lag; it was six months.

The argument was, it would be very hard at that point to use the data -- oh, and actually never to release the individual firm data.

The only thing that was released was the aggregate figures. And the argument was, it would be very difficult, six months later, to figure out -- to effectively punish a firm that was behaving too competitively at that point.

SENATOR BOWEN: It makes it harder to figure out what's going on from our side of the equation as well.

DR. BORENSTEIN: It does. It does indeed. And the sellers, by the way, argued that the data should never be made public, that they were trade secrets, effectively, of how we're bidding, is our own trade secret.

That carried enough weight that the individual firm data are not being made public. And will, I assume, go to the PX's grave with it.

SENATOR BOWEN: What about the fact that while the demand fluctuates, it tends to be fairly predictable if you know the weather, and can do a fairly simple, I think, computerized calculation of weather around the western region?

DR. BORENSTEIN: Actually, one doesn't even need to do the calculation. It's done by the ISO and announced, at least what their demand is likely to be. That's right.

And that, in a sense, makes it more transparent to all the players, the information all the other players have

about demand as a result.

The thing we know is, every player knows what resources the other players have. Players have a pretty good idea of what resources are operational to what extent, and particularly early in the market, when these data that Kahn mentioned were being distributed, they knew in real-time exactly what every other player was doing.

That sort of situation makes it much easier for firms to collude tacitly. That actually isn't a PX issue. That's just a general market interaction issue that there was, on the quantity side, a great deal of information available, and it continues to be.

SENATOR BOWEN: Is there any way to have an effective short-term market, an hour-ahead, a day-ahead market that doesn't have that kind of information readily available?

DR. BORENSTEIN: I guess I would have to defer to engineers. The reason those data are made available are for engineering reasons, having to do with stability of the grid, and other stuff like that.

To the extent that the players don't need to actually have that information, there's a very strong argument for not making those data available, certainly in real time. Maybe with a long lag.

But we were sort of in the worst possible situation from public policy standpoint, engineering issues aside, that we were releasing the data in real-time to the players so they could watch each other, while at the same time, the data were kept secret from outside researchers.

SENATOR BOWEN: How does it work to have the participants have the data, the sellers to have the data, while the purchasers don't? And here I'm not talking about just the three investor-owned utilities, but Joe's Widgets and Bill's Coastal Corporation.

DR. BORENSTEIN: Well, I guess in a sense I'm not sure it really matters that much in the current operation, though it would matter if we had a healthy demand side of the market, which we do not have.

Under the current situation, Joe's Widget wouldn't care what was going on in the wholesale market because Joe's Widget prices are completely disconnected from the wholesale market.

If we had a healthier retail market for Joe's Widgets, so that they were buying at prices that were reflective of wholesale prices --

SENATOR BOWEN: That's what I'm hypothecizing. We did have that experience last summer in San Diego.

DR. BORENSTEIN: Well, I would argue we did not have that experience. We had a very bad experience, but it wasn't that experience. It wasn't real-time pricing. It was with a long lag. And by the time consumers got their bills, they also got a lot of signals that they wouldn't have to pay them. So, it's really hard to know what consumers would respond to in that situation.

And indeed, they didn't end up having to pay them.

SENATOR BOWEN: But the question, I think, is
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more basic than that. How do you establish a market system where the buyers, immediate buyers and sellers, have the kind of information that they need to be able to make the transactions without -- how do you do real-time metering without having the disclosure of that information in a way that allows --

DR. BORENSTEIN: Oh, real-time metering requires disclosure of a periodic hourly, for instance, retail price. That's all it requires.

You, as Joe's Widgets on real-time pricing do not need to know, and frankly, probably don't care who's generating, or how they're generating, or anything else. All you need to know is, what's the price from 2:00 to 3:00, what's the price from 3:00 to 4:00, et cetera.

So, I don't think that there is a need to reveal the data from an economic standpoint to either side. There is a market going on that's determining prices.

If you are a competitive player, and you're bidding particularly in a uniform price auction, you have a very simple bidding strategy. You bid, if you're selling, you bid your cost so that you'll be in the market if the price is above your cost. If you're buying, you essentially buy as long as price is below your value.

SENATOR BOWEN: That's not even close to what we're seeing right now, bidding of cost.

DR. BORENSTEIN: No. There is substantial market power in this market.

SENATOR BOWEN: I think another really significant question here is, looking at the history of supply
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of electricity, why we would make the assumption that we won't periodically always experience, to a lesser degree, the kind of shortfalls that we're seeing now?

DR. BORENSTEIN: Are you saying shortfalls in quantity?

SENATOR BOWEN: Yes.

DR. BORENSTEIN: I think a fundamental flaw in the organization of this market -- well, two fundamental flaws. One was that utilities were not allowed to hedge. The retail provider was not allowed to hedge. And the main retail providers were utilities.

SENATOR BOWEN: Although that's only sort of the true, right? Because they have their own native generation. They have all the nuclear, all the hydro, all the QF.

DR. BORENSTEIN: Indeed. But if you compare our market to PNJM, the Pennsylvania, New Jersey, Maryland market, the principle difference in the outcomes is not that they don't have price spikes. They do have price spikes. They had extreme price spikes in 1999.

But, they were not exposed for very much of that cost.

SENATOR BOWEN: How do you deal with the issue that you raised a few minute ago with regard to the utilities' lack of a fiduciary obligation to their ratepayers, and the issue of hedging?

What did happen when they did get the ability to hedge is, they didn't use it very fully because they didn't want to put their shareholders at risk.

DR. BORENSTEIN: Actually, I think I would differ with you on that.

They got a limited -- well, to some extent I would agree. The 20 percent hedging that they were permitted, actually they were covered on. That hedging, the PUC assured that they could recover. So, it was the opposite of the gas situation.

Their argument, and rightly to some extent, and I say this as somebody pretty familiar with the PX markets, is that the PX forward markets were pretty thin, and were not great markets to hedge. And that's where they were required to do their hedging, at least up until 2000.

They also would argue, correctly, that the PX didn't have very long forward markets. You want to buy forward, not three months in advance. You want to buy forward five years in advance.

SENATOR BOWEN: But the PX wasn't set up with any forward markets.

DR. BORENSTEIN: That's right.

SENATOR BOWEN: If it was so important to give the utilities the ability to hedge, why didn't 1890 or the PUC's proposal set up any kind of mechanism to deal with contracting forward?

DR. BORENSTEIN: Well, I certainly cannot address the political side about why AB 1890 didn't have it.

I can tell you --

SENATOR BOWEN: I think AB 1890 didn't have it because Governor Wilson sent a letter to the Legislature saying

he would veto anything that was different in a significant way from the PUC's plan. That constrained the negotiations here in a fairly significant way.

DR. BORENSTEIN: Okay.

Here is the flip side of the argument about hedging. And if I were a PUC Commissioner -- and I think the

PUC Commissioners would make this argument correctly, although I don't think it carries the day.

If you're going to approve -- what you would like to have is buyers who can hedge long-term, and then go to the PUC, and have the PUC at the time the hedge is signed, or is about to be signed, evaluate it and say, "Yes, this is okay. This is a prudent contract to sign. We will never revisit this contract, regardless of where prices come out."

SENATOR BOWEN: How is that a deregulated market? You're still then doing a review of their procurement process.

DR. BORENSTEIN: That is necessarily the case as long as you have a regulated retail provider. Your AB 1890 basically, or the whole deregulation process set the utilities in a position of passing through or of being the provider, until retail competition came along.

With retail competition, you wouldn't have the retail competitors reviewed in that way. Retail competitors could go out and sign long-term contracts, come to buyers and say, "Here, we can offer you this deal." And they wouldn't have to get permission from anyone.

That, by the way, is effectively what Enron did with UCCSU. They signed a long-term contract to provide power

to UCCSU. I presume they covered it on the other side; that is, they bought power on long-term contract, and thought they were going to make money.

SENATOR BOWEN: And then when they got in a position where they could make more money somewhere else, they promptly bailed.

DR. BORENSTEIN: They bailed. And in fact, what they have done is, they have leveraged the fact that we are subsidizing retail rates.

SENATOR BOWEN: So how much of this is structural flaw, and how much is learning curve?

I mean, there's no question that some of what's happened is the result of the fact that we have an entirely new kind of market that no one has ever experienced before in electricity. We don't have the infrastructure for things like real-time metering. Nobody's seen what happens in a tight kind of supply. So, clearly, there are some issues that are just people figuring out how the world works.

We've been through that with telephone, too, with little old ladies signing up for services they didn't need because they thought their service would get disconnected if they didn't.

How much of it's that, in your opinion, and how much of it is structural flaws in either the way the market's structured, or in the review of market-based rate authority at FERC? Or, for a Chinese menu approach, pick another column if you don't like any of those.

DR. BORENSTEIN: This is the big question.

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SENATOR BOWEN: Why would I bother asking you small questions?

DR. BORENSTEIN: Right. What you mean by how much of this, is, I think, how much of the extreme wholesale prices that we're facing right now that potentially will bankrupt --

SENATOR BOWEN: Set aside the failure of the PUC to increase rates in any significant way, because that clearly is a contributing factor. We didn't send appropriate signals on a timely basis.

DR. BORENSTEIN: Well, this sort of gets to -- in the paper that I suspect Senator Dunn's going to get to, "The

Trouble with Electricity Markets," I partitioned this into three different parts.

Part of the increase has been driven by increases in real costs. Natural gas prices have gone up. NOx costs have gone up.

It's important to recognize that an increase of that sort has a very different effect in a competitive market -- we're going to put market power aside for just a second -- than in a regulated market. In a regulated market, when the cost of the marginal unit goes up, the only thing it raises is the price to the -- the payment to the -- sorry, in a regulated market, when the cost of the marginal unit goes up, you just pay a little bit more for the marginal unit.

In competitive market -- and this has nothing to do with the auction format; this is just how markets work -- when the cost of the marginal unit goes up, it drives up the

price of all the price in the market, which is the price that all generators receive. So, that effect is the fact that when we got into the marginal unit getting very expensive, it drove up the price for all the power you bought has been a part of it.

And then the third effect is that we don't have a competitive market. That the price is not just being driven up by going up a supply curve, and when things get scarce, the price goes up, but it's also being driven by strategic behavior by generators.

Which, by the way, I think Senator Dunn said this earlier, is not necessarily illegal, and I think was completely forecastable. In fact, the paper that Bushnell and I wrote in '96 essentially tried to do that forecasting, tried to take seriously the strategic incentives of the players and say what would they do if they were trying to make as much money as they could.

SENATOR BOWEN: I think I've tried to make it clear as we've looked at this that it isn't just a question of who colluded, or who did this or that, because that is not the standard under the Federal Power Act.

DR. BORENSTEIN: Yes, right.

SENATOR BOWEN: It doesn't say you can do whatever you want so long as you don't --

DR. BORENSTEIN: Right. The Federal Power Act has a different standard than the anti-trust law does. The Federal Power Act is concerned about unilateral exercise of market power. The Federal Power Act is; the FERC is not, it appears.

SENATOR BOWEN: Thank you for the differentiation. I think we've figured that out.

DR. BORENSTEIN: So, I don't have a numerical breakdown, but roughly speaking, I would say the regulated cost increase part probably would have accounted for an increase of something like -- just sort of the back-of-the-envelope calculation -- something like a 25 percent, 50 percent increase in wholesale prices. So, if they were 7 billion in 1999, they would have been maybe 9 or 10 billion.

The scarcity effect is hard to know directly. But we have done estimates in the Borenstein, Bushnell and Wolak paper of -- we now are working on estimates for 2000. And our estimates for 2000, for at least the summer of 2000, look like we had an increase on the order of 4 to 5 billion dollars due to market power.

Well, if we went from 7 to 27, the market power effect is probably larger than that for the whole year, so I would say probably a couple million due to increased -- couple billion due to increased costs. Probably 5 or 6 billion when we do the whole year, maybe a bit more than that, due to market power, and the rest due to the fact that when the price goes up, it just takes the entire market up with it under real scarcity.

SENATOR JOHANNESSEN: Come back to your paper, 1996 paper, where you raised the flag, if you will, on the potential of market power under the deregulation scheme which was being hatched in California.

Were you aware of the heavy lobbying that was made by the utility companies in order to pass that piece of

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legislation? And what conclusion can you draw from that?

DR. BORENSTEIN: That they blew it.

SENATOR JOHANNESSEN: That we blew it?

DR. BORENSTEIN: That they blew it. The utilities lobbied for something that ended up bankrupting them.

My guess is that they didn't understand this. Frankly, as much as I would like to say I told you so, and to some extent I think Jim and I do have -- are in a position to say that, we didn't forecast things getting as haywire as they were.

What we didn't forecast, we didn't forecast two important aspects of this. One was the price of natural gas going up, and going up more in the west.

And the other was the extreme growth in demand in the entire WSCC. This isn't the -- people get into these arguments over whether we should have known California, and whether it was all forecasted. It's pretty clear that we didn't -- there wasn't an accurate forecast that the entire WSCC would balloon, particularly that Arizona and Nevada would greatly reduce exports because their own demand would go up so fast.

So, we didn't get the full magnitude. I think that the utilities didn't really get the basic notion that this is an extreme, potentially an extreme problem.

And I think that their forecasts were primarily driven, and I have some -- I've been told this by some utility people, I can't remember which company -- by production cost models. Production cost models just take the costs and crank through them and say, what' the marginal price, and doesn't take

into account the effect of the -- of market power. There's no strategic behavior in production cost models.

So, my guess is, the utilities just missed it.

SENATOR BOWEN: That's actually part of what I was talking about when I talked about learning curve. Because when I look at some of this, I see utilities that grew up and lived in a regulated era. And, you know, the whole mechanism for dealing -- I saw the same thing in aerospace, you know, when they were dealing with defense conversion issues, and trying to move from a military cost-plus contract kind of market to a competitive market where your customers actually cared what they paid for something. So, some of it's that.

But then the question comes about, well, how is it that some of the generators, who are regulated utilities in their home states, were able to figure it out?

DR. BORENSTEIN: And PG&E is an unregulated player in other states. In that unit, they have hired people who they recognize have to be very savvy about the operations of market.

My understanding is, they've been pretty successful.

And certainly the people in the companies who trade -- who sell in California, many of whom are public utilities in other states, at least the people that operate here, many of them are very, very smart. And they've gotten much smarter, I think, over the last three years. They are better -- they have a better understanding of how this market works now than they had three years ago. So do we, but they

make more money.

SENATOR BOWEN: However, it appears to me that just being really smart and understanding how the market worked would not have prevented us from seeing some of the price increases that we've seen because of the structure of the market, which is why I was trying to separate the opportunities for engaging in strategic bidding behavior, or strategic withholding that raises prices.

Just being smart is not enough to counter that if the markets --

DR. BORENSTEIN: Yeah. Once the utilities -- once this was launched under this set of rules, and the generation was sold off in the way it was -- though remember, a lot of the generation was sold off after the summer of 1998.

SENATOR BOWEN: Some of the generation was not in AB 1890.

DR. BORENSTEIN: Yeah, but Borenstein, Bushnell and Wolak had an early version out in late '98 saying, boy, there was market power here during the summer of '98, and yet sales were made to companies that already had significant capacity.

And Borenstein, Bushnell, the simulation of what could happen, was out in '96 saying, you know, these concentrations really matter.

So, I think that there was some warning. I will tell you that Jim Bushnell and I presented the simulation paper in March 1997 at a conference, our annual Power Conference, and were practically hooted out of the auditorium because we said,

you know, prices could go over $250 a megawatt hour. People said, oh, come on; that's ridiculous.

And in fact, if you look at the published version of the paper -- if you look at the published version in the Journal of Industrial Economics, there is a sentence at end that says, "We, of course, are not suggesting," something like, "We, of course, are not suggesting that prices would actually be allowed to go this high because we think it quite likely regulators would step in if things got that outrageous." But our simulations indicate that without -- absent intervention, prices could go that high because we had been told that this was ridiculous, that that would never happen. And even if it did happen, regulators would stop it.

CHAIRMAN DUNN: Let me do a couple follow-up to Senator Bowen, if I may. Then I just have a couple other very specific questions on your first report.

As you mentioned, one of your reports in '98 saying, wait a minute; there's evidence of market power here in this particular California wholesale electricity market; correct?

DR. BORENSTEIN: Yes.

CHAIRMAN DUNN: Yet, there were many of the applications that were made to FERC for market-based rate authority from those assets that were made after that date.

Are you aware of anyone that filed any opposition, objection, criticism to the filing by any of the generators for that market-based authority on the grounds that they were in possession of market power on the California

wholesale electricity market?

DR. BORENSTEIN: I'm not aware of it. And I have to confess that at the time, I don't even think I was aware that there were still approvals going on. I think I probably thought at the time that as soon as they sold the assets, they sort of automatically got market-based authority.

I have since become much more aware of that issue.

CHAIRMAN DUNN: Have you done an analysis as far as let's take with '98. Who in your opinion had the ability to exercise market power?

DR. BORENSTEIN: I have not -- Borenstein, Bushnell and Wolak was, I think, the first to use this approach in California, though there were earlier papers that had done it in the U.K., that essentially took a production cost model approach, and said, if you were just dispatching all the assets, what would the cost have been? And said that's the competitive price, and then compared it to the market price.

That approach doesn't allow you to identify who's exercising market power. It just says the market's ending up at a higher price than the competitive price.

That said, the earlier analysis, the Borenstein and Bushnell simulation approach, had gone through this approach of saying, well, a company, and company could have been just Company X, with a certain size of generation assets, would have the following ability to exercise market power.

If you look at that analysis, we were wildly optimistic because we assumed that demand would have an

elasticity of point one. That is, a 10 percent increase in price would lead you to a one percent decrease in quantity, and the demand has an effect on elasticity of zero.

So, what we found, the numbers we found were optimistic lower prices than you would have expected.

If you do that analysis with the current structure of the California market, it's quite clear that all five of the merchant generating companies that have between 3,000 and 4,000 megawatts of capacity are in a position to exercise market power. They will respond by saying -- they will respond in many ways, and one of them is saying, that's less so if they've contracted out their power, and that's right. I have never been able to get data on how much they've actually sold.

CHAIRMAN DUNN: Wouldn't a complete analysis, though, require who contracted, to whom did they contract, and under what circumstances is that power still available?

DR. BORENSTEIN: Well, if we're going to go down this road, let me make what I think the critical point is.

What matters is, who controls the real-time output of the plant, and how that is related, and what their financial position is in the market.

So, if you have a company that has sold a lot of power -- or has bought a lot of power in a financial forward contract, but they don't control the output of any plant, then they're not going to be able to exercise market power because they can't tell somebody not to produce.

If the sellers have contracted all their power forward, and they themselves are the ones who are in a position

to determine the output of their plants, they'll then have very little incentive to restrict output.

So, it's a complex calculation, but it's a matter figuring out who actually controls the operation of the plant, and what their financial position in the market is.

The simplest organization would be if there are no contracts, and that's the analysis we did. And a company owns 3500 megawatts of capacity, and you can see exactly where it is in the stack, what's their incentive to withhold capacity or to bid up? That's an easy analysis to do. That's what Borenstein and Bushnell, the simulation paper, does.

And if you do that with sort of the lack of demand elasticity we've ended up with, you'll find out those firms are in a very strong position to exercise market power.

CHAIRMAN DUNN: To your knowledge, is anybody doing an analysis of the more complex, of what power is contracted for, and by whom, et cetera?

DR. BORENSTEIN: Not to my knowledge. We would love to do that, but you need to get data, and you need to sort of unwind the full financial position of each company. And that would require a very large amount of data, that I am not completely certain exists in one place. I mean, you would need to bring together contract positions, and understand each contract.

There's a very difference between what's called a firm contract and a nonfirm contract. A firm or a financial contract that essentially says, you're just responsible for paying for 4,000 megawatts for me; I don't care how you get it.

If your generator's running, you can produce it. If it's not running, you can buy it.

That has a very different impact than a contract that says, so long as your generator's running, you have to deliver 3,000 megawatts. If your generator goes down, you aren't liable. That sets up a very different set of incentives.

CHAIRMAN DUNN: And the vast majority of that information you're referring to rests with private companies?

DR. BORENSTEIN: Yes.

CHAIRMAN DUNN: We'll first go to Senator Johannessen.

SENATOR JOHANNSSEN: I'm sure you're well aware of the fact that there was a lot of long-term contracts at the low price, maybe one-and-a-half, two-and-a-half, three cents a kilowatt hour. That was really major. A lot of it huge users.

DR. BORENSTEIN: These are between private companies?

SENATOR JOHANNESSEN: Yes. And that what in essence happened was that the distributor, if you will, asked to buy the contracts for a certain amount of money above making a profit to the user. Then, in turn, held those contracts, or the power that those contracts represented, and then resold them again when they got the amount out of the contracts that they wanted.

So, in other words, the contract itself became a commodity.

DR. BORENSTEIN: Right.

SENATOR JOHANNESSEN: Does that make sense?

DR. BORENSTEIN: I understand what you're saying. I actually don't have any detailed knowledge of this going on.

The predicate of your question --

SENATOR JOHANNESSEN: For example, the one that is probably the most glaring one was the contract, Aluminum Manufacturing.

DR. BORENSTEIN: Oh, you're talking about final consumers, right.

SENATOR JOHANNESSEN: So, what in essence they did, they could make more money on this power, and they just stopped the production. Sold that contract or the use of that contract for whatever time limits they wanted. And they, in turn, then exercised the market power by holding that contract in order to get them -- they had a multitude of these.

There was a lot of contracts that were put together as a bundle in order to have it on the future market, or in order to have it on the market itself, if you will, the commodity market, and waited for the opportunity, then, to resell at the much higher price.

That also here, I think you mentioned the laundering. That also happened here. I'm very familiar that it happened here, where they would sell to an out-of-state, who would then, in turn, sold it back to the state when the price was right.

This, to me, is pure manipulation of the market. Whether it's legal or not, I'm not an attorney so I wouldn't know.

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DR. BORENSTEIN: Well, I guess --

SENATOR JOHANNESSEN: In other words, we're dealing with it as a commodity.

DR. BORENSTEIN: I think it's very important to distinguish simple speculation and even price-taking behavior from firms that are actually able and trying to move the price.

So, in itself, I am not bothered by a company that contracts for 500 megawatts of power, and the price of power goes through the roof, and they figure out that they can make more money selling the power than using it themselves. That's fine. In fact, we're hoping a lot of companies will do that this summer so that California will avoid blackouts.

We would like the aluminum companies to shut down instead.

If the aluminum companies actually are buying contracts in a way that allows them to move the price, and that would depend on the structure of those contracts as well, then that's a real concern. I just have not followed it to that detail.

CHAIRMAN DUNN: Mr. Drivon.

MR. DRIVON: Dr. Borenstein, just a couple of quick things.

First of all, you indicated that you did not, and you didn't think anyone around here, forecast the vast increase in demand over the entire WSCC. That is to say, forecast it back in, let's say, '94, '95, '96 timeframe.

My question is whether or not you're aware of forward forecasting, I guess that's the same thing, done by

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people who had more regional interest in the market, for instance, regional market players?

DR. BORENSTEIN: I'm not, but I would say that even if they did do it, this is an extreme -- you know, the CEC has made the claim that it got these forecasts pretty right. And some of their forecasts were pretty accurate.

But I think a lot of people didn't rely on those or any others, because these are notoriously difficult forecasts to make. In order to make a forecast of energy consumption, you start out having to make a forecast of the macro economy of the region. And we know from history that economists who make those forecasts are generally pretty bad at it. That's a really hard thing to do.

For instance, if we had had a good recession in '98 and '99, I would not be sitting here today, and we would not have a crisis today.

MR. DRIVON: So, it wouldn't be particularly responsible for a major market player to make a flat-out prediction on the lack of need for future generation capacity, say, in the '94 time period?

DR. BORENSTEIN: Well, they have to make some forecast in order to do their planning.

But what I'm saying is, I wouldn't -- any one forecast, I wouldn't put a lot of credence in because -- not because I think these people aren't doing the best they can, but because it's a really difficult thing to forecast.

MR. DRIVON: The other question that I have is, you spoke of the potential for doing a study with respect to the

contracts, and sale of forward contracts, and hedging, et cetera, that may have been done, but there would be a lot of data needed, much of which would have to come from private companies.

My question is, whether or not you would be under any constraint to consider doing such a job if the information were available?

DR. BORENSTEIN: I'm not sure what I'm being asked. Are you asking, would I do it if the data became available?

MR. DRIVON: Yeah.

DR. BORENSTEIN: The constraints I'd be under would be constraints on my time. I teach. I run an institute.

But it's certainly the sort of the study I'd be interested in doing.

MR. DRIVON: You wouldn't try to do a study like that all by your little old self anyhow; would you?

DR. BORENSTEIN: Graduate students are helpful. Other researchers are helpful. If I'm going to put my name on it, I would be very deeply involved in it.

MR. DRIVON: Could you produce a list of material that you would think necessary to conduct such a study?

DR. BORENSTEIN: I could give it to you right now.

We need every contract on every power, on every long-term power sale, between any two entities. And we need the whole contract, not just the price and the quantity, but the structure of the contract.

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MR. DRIVON: And you would also, I would assume, need all of the affiliate interconnections between the various --

DR. BORENSTEIN: Yes, the ownership interconnections, that's right.

MR. DRIVON: Okay, I think we got it.

DR. BORENSTEIN: Great.

MR. DRIVON: I mean, I think we've got the list.

DR. BORENSTEIN: Oh, you have the list, not the contracts.

CHAIRMAN DUNN: We wish we had those.

MR. DRIVON: There are some guys sitting back here. They'll send it over in the morning.

CHAIRMAN DUNN: I'm sure they will.

Professor, let me just ask a couple of quick follow-up questions for clarification for my own sake. I want to go to Page 0058, Donna. Again, we don't need to highlight this.

This is one sentence I want to read from the report.

> "Congestion serves to fragment
> the physical market, thereby
> creating the possibility of
> market power in sub-regions."

Can you explain that?

DR. BORENSTEIN: If we're in a situation where there are no transmission constraints whatsoever in, say, the entire western grid, then if one firm tries to drive up price by

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restricting its output, there are a huge number of other players, well, a large number of other players, who can potentially respond by increasing their output and offsetting that.

If there are constraints, say, just to give you an example, if we were in a situation where Path 15 was congested north to south, and the line coming in from the east was congested into California, so that the south couldn't really bring in any more power, then if a firm tires to restrict its output and drive up price, the only players who could potentially offset that are other players in the SP 15 area.

And this sentence is pointing out that when you do a market power analysis, you have to think about whether -- when transmission constraints will segment markets.

This was, by the way, sort of the precursor to a paper you may be getting to that I wrote with Bushnell and Stoft, looking at the interplay between transmission and market power issues.

CHAIRMAN DUNN: And touched upon. I don't know if you sat through all of Mr. Kahn's testimony a little bit earlier today.

DR. BORENSTEIN: Most of it.

CHAIRMAN DUNN: He showed us a graph of the difference in withholding. Basically you're touching upon the same issue?

DR. BORENSTEIN: Yes.

CHAIRMAN DUNN: Let's go to that next paper, which, in some respects, we've touched on a little bit. It's the December '98 paper entitled, "An Empirical Analysis of the Potential for Market Power in California's Electricity Industry."

DR. BORENSTEIN: That wasn't the paper I was referring to just now, the Borenstein, Bushnell and Stoft.

CHAIRMAN DUNN: It's a little later.

The December '98 report, what gave rise to this particular report?

DR. BORENSTEIN: This was the natural next step after the Borenstein, Bushnell, Kahn and Stoft paper that we've been discussing, because that paper said: Look, you can't use these rules of thumb about market share, because demand is very inelastic because there are a lot of specific idiosyncrasies of electricity markets. But luckily, this is an industry where we have a tremendous amount of data about production capability. So, you can do something much more precise about estimating the potential for market power. You can actually look at all the production capabilities. You can look at the demand variation. You can say in each hour, with a certain kind of demand, a certain level of demand in a certain area, and transmission constraints, you can model all of that, and take into account the strategic incentives of the players.

So essentially, this is saying, you can do what the industry's been doing for years, a production cost model, which assumes that every firm is just trying -- that all the players are just trying to minimize the total cost of the system.   And instead of assuming they're trying to minimize the total cost of the system, you can assume each firm's trying to

make as much money as it can.

So, we suggested that in this paper. Then we, from there, Bushnell and I started working on that. And this paper, the original version of which was released in late '96, and presented at a conference in early '97, is that simulation analysis.

CHAIRMAN DUNN: Can you briefly discuss what you found in that analysis?

DR. BORENSTEIN: Well, what's interesting about this paper historically is, it expresses a lot of concern about -- it expresses a lot of concern about ownership of generation in large blocks. But it is mostly in the context of ownership of generation by utilities, by PG&E and Edison, the concern being, this was trying to simulate the year 2001, which we, I guess, had gotten the date wrong. We said that's the first year of post-transition. I guess we were guessing at how -- when the CTC would end.

CHAIRMAN DUNN: Actually, let me read it to you because I've got it right here. It says.

"We simulate the California market in the year 2001 because it is probably the earliest date at which the market will not be significantly distorted by transition charges and guaranteed prices."

DR. BORENSTEIN: Right.

So, the assumption that we made there was that at

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that point, the utilities would own their generation, if they still owned it, in an unregulated arm that would be allowed to bid market rates. And then --

SENATOR BOWEN: Can I interrupt?

You didn't presume that, though, with regard to nuclear or hydro; did you?

DR. BORENSTEIN: Nuclear we did something special with, as I recall, but I think hydro actually we did. I'm a little fuzzy. I think hydro we actually assumed they would be able to treat a market-based rates.

SENATOR BOWEN: And what about QFs?

DR. BORENSTEIN: Again, I'm not sure.

The point of this paper was not to say, this is exactly what's going to happen. The point was to say, here's how you can take an organization of the market, and from there forecast what's going to happen, using -- taking into account strategic incentives.

In fact, we went through a number of iterations as we were writing this, because each time we wrote it, the divestiture plan changed. So, what finally got published was very different from the original. In fact, originally, I think, we simulated a market in which there was no divestiture at all. The utilities each owned all of their capacity, and the capacity was allowed to be bid at market rates.

Then, on the retail side, they just passed it through. Not surprisingly, they would have made a whole lot of money.

But the point of this paper was to take a given

structure of ownership of capacity, and say, if that's the structure, and if firms try to maximize the profits, here's what will happen.

What we found was that, even with our optimistic assumptions about demand elasticity, we assumed there would be some, there would still be real problems with market power.

We didn't do the simulation that we should have done, which is one in which there's virtually no demand responsiveness. Had we done that, we would have had a pretty good estimate of what happened.

In fact, we have done some backcasting, looking at -- trying to look at, given how the market ended up, if you go back, and you apply this analysis, and for summer 2000 it's pretty accurate.

CHAIRMAN DUNN: Let's go to Page 0247 of this particular report. That's the page that starts with your conclusions, actually.

Since I know in each of your papers, you did a pretty thorough conclusion section, which summarized everything.

Let's go to the very first sentence. It says:

> "Absent significant divestiture of assets by incumbent producers,"

This is what you were just talking about,

> "the restructured California electricity generation market could have a few large producers each of which would potentially find it profitable to restrict

> output to raise price."

Now, I know this was written, you said, in the '97-ish time period?

DR. BORENSTEIN: Yeah. Actually, well, the version you are looking at is revised in '98, but the first version was written in '96.

CHAIRMAN DUNN: As you mentioned, you were basically zeroing in on the incumbent producers, the PG&E, the Edisons, et cetera. And you say, "absent significant divestiture of the assets."

Well, that occurred, though; right?

DR. BORENSTEIN: Well, it did. And in fact, what you'll see there is, in the paper there are, I think in the final version there are two different divests, Divest One and Divest Two, that looked at different amounts of divestment, and pointed out that divestiture would get you much more competitive -- divesting into smaller chunks would get you much more competitive outcomes.

The bigger part in this conclusion is that, it point's out that if you get much more price-responsive demand, that would make the market massively more competitive.

CHAIRMAN DUNN: But the way, now in hindsight, the way that divestiture occurred, we still found, or at least from your perspective, we still found market power in which, using the language you use here, in which the market participants would find it potentially profitable to restrict output to raise prices.

DR. BORENSTEIN: That's right.

CHAIRMAN DUNN: Even though it's not necessarily the incumbent producers, as we were concerned here.

DR. BORENSTEIN: Right.

There's nothing special about the incumbent producers. In fact, we sort of treated them as if they were just profit maximizing generating companies that just happened to be related to the incumbents.

The point was, the incumbent producers would own a very large block of capacity.

CHAIRMAN DUNN: Later in the Conclusion Section you state that, as you've talked about before:

"Our approach also does not
account for the possibility that
firms engaged in repeated

interactions with one another
may compete less aggressively
over time."

Still, as of this time, not an issue that had been looked at.

DR. BORENSTEIN: That's correct.

CHAIRMAN DUNN: Has it to this point?

DR. BORENSTEIN: Yeah. We have a graduate student, Steve Puller, who is about to finish his dissertation and is doing some work. Unfortunately, the work he's done so far only looks at 1999 and '98. He hasn't updated it for 2000 yet.

For '98 and '99, his results are that in those data, it's hard to find anything -- that it's hard to find

anything that couldn't be explained as just unilateral exercise of market power.

CHAIRMAN DUNN: Let me state that in the positive.

In his '98-99 findings, what he found could be explained by unilateral exercise of market power.

DR. BORENSTEIN: Right. And in 2000, that might change. It wouldn't surprise me.

CHAIRMAN DUNN: Is he studying 2000?

DR. BORENSTEIN: Yes. He is trying to get all the data put together for 2000. He's also trying to finish his dissertation and move to -- I guess I should -- to Texas A&M University, where education funding is likely to be much better than in California.

CHAIRMAN DUNN: We won't get into any comparisons of California versus Texas in that regard.

You mentioned at the very end of your Conclusion

Section, and Donna, I'm on 0248, the very last paragraph, if you could highlight that. It says:

> "While our finding of some potential for market power makes deregulation of generation less attractive than if there were no possibility of market power, this finding should not be seen as suggesting that deregulation is a mistake. Very few markets are completely devoid of market power.

> One must compare the prices consumers will face in a deregulated market with the outcome under an alternative, such as continuation of the pre-deregulation regime. We have not attempted to forecast prices under continued regulation or to make such a comparison."

Has anyone to your knowledge done that comparison?

DR. BORENSTEIN: No. I don't think you really could do it. This is like the -- we've done a lot of work in the airline industry, and worked at the CAB during airline deregulation. This is like the people who attempt to say how much we have saved through airline deregulation, which we have; I believe we have saved.

But you've got to make some assumption about what would have happened if we'd continued to regulate. And the counter-factual is very difficult to justify.

Would we have made more mistakes like Diablo

Canyon? Maybe.

The goal, as Bushnell and I have pointed out in another paper of deregulation, the real tangible potential for deregulation was better prudency in investment decisions. That's sort of a long run calculation that's very hard to evaluate.

CHAIRMAN DUNN: Let's go to your next report. I'm sorry, Senator Bowen.

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SENATOR BOWEN: Let me turn to the question of market share again and ask you about some other factors that I'm concerned about.

As I try to sort through what we ought to be asking when we make a determination of market power, a number of things occur. One, of course, is that, as you noted, the natural gas supply affects price. Natural gas is also a traded commodity. Natural gas pipeline capacity became a traded commodity for the first time, or became traded in a different way effective about a year ago.

What effect, or what ability to manipulate the market, or to change the outcome of prices, could someone have by dealing not with supply directly, but with critical inputs or the transportation mechanisms to get the critical inputs to the place where power is generated?

DR. BORENSTEIN: Well, I mean, it's clear that natural gas, the pipeline transmission of natural gas to California has been a real issue. There's no question, there's been a scarcity of capacity. The question is whether it's a real are or fabricated scarcity, or how much of it is each.

To the extent that a firm, if it were able to restrict the supply of gas into California, and drive up the price for natural gas, it could make money just in the gas market. But it could also potentially also make money in the electricity market, because assuming that the price is getting set by the marginal producer who is generally a gas-fired generator, it would drive up the price in the electricity market. And because this is a commodity market, it would raise

the price for all the power sold in that market.

So, by restricting the output, if a firm were able to restrict the output of gas into California, it would drive up the cost of marginal generators of electricity and would raise the profitability of all generators who are running.

SENATOR BOWEN: I ask this because we've seen such extraordinary differences in the price of gas delivered in California and border gas. And when the QF formula was changed, we saw the border price shift, based on whether or not we were specifying Topok or Malin.

DR. BORENSTEIN: Yeah, I haven't really followed the data there very closely.

I do want to point out that mere a price difference, even a large one, is not evidence that something nefarious is going on. That is, if the pipeline is running full out, and there is just a real shortage of gas in California, even when you're pumping as much gas as you can --

SENATOR BOWEN: The evidence that I've seen, and the reason that FERC is actually looking at the gas pipeline issue, is that the gas pipeline was not full.

DR. BORENSTEIN: And that is very strong evidence, if that's right.

I just want to sort of weigh in saying, that's the sort of evidence to be focusing on, not the fact that the price is $5 in New York and $15 the California.

SENATOR BOWEN: It's the price that catches our attention.

DR. BORENSTEIN: It is, but if you're worried
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about anti-competitive behavior, it's that under utilization of available capacity that would be a pretty strong signal.

SENATOR BOWEN: Is there any restriction on someone who's generating electricity from making an arrangement with somebody who has pipeline capacity or natural gas capacity?

DR. BORENSTEIN: I don't know. I don't think so, but I'm not sure.

SENATOR BOWEN: How do you deal with the trading piece of this? We've been talking about concentration of ownership, but the fact is that in a market where power or natural gas is traded as a commodity, you could very well obtain functional control over a significant amount more than what you actually own in order to then engage in withholding in order to drive up the price on a portion of what you do need to sell?

DR. BORENSTEIN: Yeah, but let me -- this goes back to my point earlier.

Once all this trading in contracts, there are two potential issues. The market power issue in the standard market power sense only requires looking at the firms that actually have the decision-making power on what a generator is going to produce. Those are the firms -- those are the only firms that can exercise market power.

SENATOR BOWEN: Wait a minute.

What if I'm Joe's Trading, and I have Joe's Generating --

CHAIRMAN DUNN: I'm beginning to own a lot of things here. Before it was widgets.

SENATOR BOWEN: How about Severin's Generating
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owns 4,000 megawatts, and Severin's Trading has the ability to go out and contract for an additional amount during peak hours. We're not too concerned about off peak.

Don't you have to look at that?

DR. BORENSTEIN: The question would be then, is that contract a financial contract, or is it a physical contract?

There are two issues here. One, if they actually have the ability to control that other generator, then they effectively control 8,000 megawatts of capacity.

If they don't have the ability to control that other generator, but they have a financial stake, then you have to do the calculation of how much of the 4,000 that they do control would it be worth withholding to drive up the price on the 8,000.

SENATOR BOWEN: That is the calculation?

DR. BORENSTEIN: Yes, that's exactly the right calculation.

But if you had a company that didn't control any capacity, and it just had a contract, a financial contract for 8,000 megawatts, then you wouldn't be worried about market power.

You would potentially -- and this is a distinction, this is why I don't use the term market manipulation to describe market power -- you would be potentially concerned about market manipulation in the standard commodity market sense. That is, buying up a lot of a commodity and forcing delivery on it, or threatening to force delivery on

it.

You probably remember Bunker Hunt in the early 1980s cornered the silver market. Bunker Hunt was not a producer of silver. What he did is, he bought up a lot of silver contracts. The silver futures market is one that generally most of the contracts close out without any exchange of silver. And what he essentially did, he said, "Okay, now I want the silver." And there, of course, wasn't enough silver in stock to provide it, and so that drove the price of silver up, and then he unloaded the contracts.

That wasn't an exercise of market power in the silver production market. That was market manipulation of the silver commodity market.

A firm that has a contract for 8,000 megawatts of capacity does potentially have an ability to manipulate the electricity market. That's not an area that I've really done much work in.

We did have a paper presented at one of our conferences a few years ago that pointed out how it could be done.

SENATOR BOWEN: So, who does look at those market trading issues?

I mean, the one action that the Federal Energy Regulatory Commission has taken was aimed at a company that does not, in fact, own any generating, although it does control under contract.

DR. BORENSTEIN: This was the silver peak?

SENATOR BOWEN: Williams.

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DR. BORENSTEIN: No, no. Let me be clear.

My understanding is, Williams effectively does control. I may be wrong on this, but I think the contract Williams has with AES gives Williams the ability to decide how much the physical generation is going to produce. In that case, it's just the same as Williams owning it. That's just, Williams is just essentially wet-leasing a generating plant from AES, to use the airline term.

A wet lease is the plane with all the personnel. This is the generator with all the personnel.

SENATOR BOWEN: Except without the natural gas.

DR. BORENSTEIN: And Williams, yeah, Williams has to bring its own natural gas to the table.

SENATOR BOWEN: No, AES had to produce it.

DR. BORENSTEIN: AES had to? Okay.

This is the point. These are exactly the issues, if you're going to do this analysis, you've got to know exactly who's bringing what into the contract. And from that, you can figure out incentives.

Unfortunately, FERC blew off all of the incentives stuff and just said, "Well, if you got 20 percent, you have market power; if you don't, you don't."

SENATOR BOWEN: What do you mean, blew off all of the incentives?

DR. BORENSTEIN: Bushnell and I in 1990 -- or Bushnell and Kahn and Stoft and I, since '95, have been pointing out that, first of all, market power, the DOJ guidelines are very bad guidelines for market power in electricity.

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And second of all, there's a much better way to do it.

And yet, the FERC has continued to focus on concentration of market share numbers.

SENATOR BOWEN: You were saying someone else has done some work on the trading issues? Who is that?

DR. BORENSTEIN: Craig Pirrong, a guy at Washington University in St. Louis, wrote a paper. Craig has studied futures markets quite a bit, and he wrote a paper on manipulation of an electricity market, and how it would be done, and what you would need to have to do it.

In fact, I think Ed Kahn might have also thought some about this at times. I think Ed may have been the discussant of Craig's paper at our conference.

But that is sort of a different issue than the market power issue per se.

SENATOR BOWEN: It is a different issue, but as we're looking at --

DR. BORENSTEIN: Oh, yeah.

SENATOR BOWEN: One final question, and it has to do with bilateral contracts and the comment that you made about what you would need to know.

I guess one of the themes that we have emerging here is the difficulty in institutionally creating effective market monitoring mechanisms.

DR. BORENSTEIN: I have to say, in 1997, I joined the Power Exchange Governing Board, and there was a discussion of the Market Monitoring Committee of the PX. And I was quite

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concerned about market power back then. I had written this paper with Bushnell.

And I made the statement there that I didn't understand what the term effective market monitoring meant, because you can monitor till the cows come home. If there's nothing you can do about it when you find it, there's not a whole lot of point to it.

Yet, we moved ahead with this idea that this was okay, because we would monitor or surveil our way to competitive markets.

What we did, of course, is we monitored ourselves right into noncompetitive markets because we didn't have any actual levers.

CHAIRMAN DUNN: Can I throw something in at this point, Professor?

SENATOR BOWEN: That part I've noticed.

CHAIRMAN DUNN: There's an adage. As you may be aware, I did a lot of product liability work in the legal profession prior to arriving here in the Senate. There was an adage we discovered that is held by engineers that work particularly for medical device firms, but I think it applies across the way.

You can't use quality control to make a good product. If it's a bad design, the quality control is not going to protect you from that bad product.

Unfortunately, there were a number of companies that approached their production in that fashion.

SENATOR BOWEN: It's a well made defective

product?

CHAIRMAN DUNN: It's a well made defective product.

I assume what you're referring to is basically the same analogy here. If what we're going to do is rely on market surveillance for what is a flawed product, we're not going to inspect our way into a good product.

DR. BORENSTEIN: Well, actually I would say it's worse than that. Because with quality control, if it's a flawed product, you still can catch it and take it off the production line before it goes out.

This was like doing quality control, but having no mechanism to retrieve the product when you knew it was defective.

The Market Surveillance Committee of the ISO, which is chaired by Frank Wolak, simultaneously with BBW, Borenstein, Bushnell and Wolak paper, was putting out applications of the BBW approach that said, look, there's market power. Those started appearing in 1998.

The response was, okay so what? Or, you know, what should we do now?

SENATOR BOWEN: That's what I mean when I say institutional capacity. What does that trigger?

DR. BORENSTEIN: The thing it could trigger is FERC, but it hasn't. FERC was at first, I think, unimpressed with the numbers, which, you know, I guess -- it wasn't the numbers.

And my recollection is, the first paper looked at

summer '98 and said, the first version of BBW, and said: Prices on average were 18 percent above competitive levels. To which a lot of people said: So what? 18 percent is not that much money.

It was hundreds of millions of dollars, a sort of quaint notion now.

And the point wasn't that, you know, that money; we should do something to get that money. The point of our research wasn't.

The point was, look, this is potentially a problem. And this is something that could get a lot worse, which is what the simulation had said. The BB paper had said, if the market's tight enough, these numbers could explode.

Sure enough, the market got tight, and the numbers exploded.

And surveillance didn't really help.

At the same time, I have to say, as a Board member of the Power Exchange, I am on record as being quite unhappy with what was coming out of the internal Market Monitoring Unit of the Power Exchange, which kept up until the end, saying, "Well, you can't be sure that's market power." In fact, they probably actually said, "That isn't market power," in what I would say were extremely badly done analyses.

SENATOR BOWEN: Although, George Sladoje was here as early as last August, saying "This is not a hallmark of a normally functioning market, to see prices --"

DR. BORENSTEIN: And George has been reminded that, two years prior to that, he had said to me, "Severin, all

you ever talk about is market power, market power, market power. I've never seen somebody so worried about market power in a commodity market."

SENATOR BOWEN: I guess now he knows it when he sees it.

DR. BORENSTEIN: Well, you know, I think that with a lot of us it became more apparent.

And it wasn't that I always said, "Look, this is going to happen," that I forecast what was going to happen. But a number of us were saying this is a potential concern.

CHAIRMAN DUNN: On this particular issue, I want to follow up from something that was raised by Senator Peace during the very first hearing, which I think at the time that Professor Wolak testified.

He referenced the possibility that there may have been a report from the Market Surveillance folks at the PX that was never produced, never made public.

Are you aware of that circumstance?

DR. BORENSTEIN: I heard about this exchange. I'm not. I guess I was never clear if this referred to the Market Monitoring Committee, which is the external committee that Al Klevorick chaired, or the Market Monitoring Unit, which is the internal unit that -- who was the first? I've forgotten. There was a series of people who directed that unit, and what it was referring to.

But I don't know of any report like that.

CHAIRMAN DUNN: I want to go to the February '99 report.

We're going to take about five or ten minutes to give Evelyn a break.

[Thereupon a brief recess was taken.]

CHAIRMAN DUNN: Let's go back at it.

One quick procedural question related to the PX, Professor. I know the PX used to have a web site.

DR. BORENSTEIN: It's gone.

CHAIRMAN DUNN: It's gone. What was available through that, is that now held by the ISO? PX still holds that data?

DR. BORENSTEIN: I believe that the UC Energy Institute actually has everything that was publicly available in terms of historical data off of that. We had been serving this function before, of trying to translate their data, which were not in a real user-friendly format, to a more user-friendly format.

What the PX had was -- you've got to recognize, the PX stopped operating back in January. So, everything now -- or I guess February -- so there was no more data being added. These were simply data that were the historical data from those periods.

It closed, I think, last Friday. We grabbed everything off of it before it closed.

I assume that the PX still has all of that. The PX still does exist as an organization and will continue to for a long time because of lawsuits.

I assume the ISO is getting some of it at least.

CHAIRMAN DUNN: So, to the best of your knowledge, at least, all of that data should still be in the possession of the PX?

DR. BORENSTEIN: I'm sure it's still in the possession of the PX. It's just not on a web site.

CHAIRMAN DUNN: I want to go to the February '99 report, entitled, "Market Power in Electricity Markets: Beyond Concentration Measures," a lot of which we've already talked about, which I appreciate. I don't want to spend a whole heck of a lot of time reviewing old stuff.

Just real briefly, what led to this particular report?

DR. BORENSTEIN: This is a communication report, more than a new research report. This was an attempt to take the stuff that had been done in the Borenstein, Bushnell, Kahn, and Stoft paper, back in '95, and the Borenstein and Bushnell simulation paper, in particular, and to say -- and to make it into a sort of less technical version that -- it was aimed in large part -- in fact, an earlier version was filed with FERC, saying, "Look, concentration measures are really a bad guide. Here's a much better way of doing it. It's not very hard, at least theoretically, to do this. And here's how to do it."

Then it sort of trotted out some examples, some empirical examples and said, "If you do it with concentration measures, you'll get this answer. If you do it in the more careful, detailed way, you'll get a completely different answer."

This is why you really can't use concentration

measures.

CHAIRMAN DUNN: A question on some very specifics related to it.

Donna, if we can go to 0193 in that report. The paragraph in the middle of the page that begins, "Although the guidelines that were developed." Highlight that whole paragraph.

I know we touched upon it, but I just want to get a little more detail, really education for our sake more than anything else, Professor. It says:

> "Although the guidelines that were developed by DOJ and largely adopted by FERC make clear that concentration measures should form only a component of a market power analysis, it is also common for both FERC and DOJ to use concentration measures as a screening tool."

Then particularly the next sentence:

> "If a market concentration falls into a 'safe' level, often no further analysis is pursued."

You talked about this in your opening comments.

Have you, and we may be in just plain rank speculation at this point, any opinion as to why FERC, despite the fact that it seems most experts in the market power arena would say that concentration is only a component, why FERC seems

to use it as a screening tool?

DR. BORENSTEIN: Trying to think of an answer I can give without completely alienating them.

I think basically FERC is a regulatory organization that has historically not had to do the hard economic analysis, and is not equipped to do it. So, when it came to face these hard economic analyses, they looked for guidance elsewhere.

What they did is, they took the DOJ guidance and took it too seriously, because they did not really have the expertise internally to do much more than that.

That's not entirely accurate, because actually they did have some very good people, but those people were, by and large, marginalized and not -- had no input.

Steve Stoft spent a year at the FERC, and has described his experience as one of being essentially put in a corner and ignored.

CHAIRMAN DUNN: Fair to state this in lay terms in a sense that, as you put it, FERC was a regulatory body looking at the world through its cost-based regulation. Once it moved to market-based regulation, from your perspective, and many others, I suppose, the analysis from FERC should be much different. And the personnel change that may have been necessitated because of that change wasn't actually made at FERC. There may have been some personnel, but their voice was not heard?

DR. BORENSTEIN: That's right, and I have experience at this through the Civil Aeronautics Board and the

transition that was necessary there in the late '70s, when CAB started deregulating airlines. And it required a very big change over personnel, and there was some real internal conflict as it went from a sort of legal process oriented organization to an economic analysis organization, where -- because prior to the '70s, the CAB operated very much like the FERC. It was, parties came in. There was a lot of concern about ex-parte communication. There was a legal process, and something came out of that.

And as the CAB went through airline deregulation, it developed the internal staff to do policy analysis. FERC hasn't really done that.

CHAIRMAN DUNN: Do you see any changes in the FERC staff now? I mean, we're here at the end of May in 2001. To this date in your opinion has there been that change that is necessary?

DR. BORENSTEIN: I have heard indirectly very recently that the FERC is continuing to use the 20 percent rule of market share. I find that extremely disturbing.

I have not heard anything positive in the other direction, that they have become more sophisticated in their analysis.

Certainly, the study that was released in February, in which they tried to diagnose withholding by calling up generators and asking them if they were withholding, didn't reassure me.

CHAIRMAN DUNN: Senator Bowen.

SENATOR BOWEN: I figured if you did that as a

graduate student in one of Severin Borenstein's courses --

DR. BORENSTEIN: You would not do that. It wouldn't happen.

SENATOR BOWEN: They did change the boxes on the organizational chart to create an Office of Market Rates and Tariffs.

Is there any mechanism that the state can use to deal with at least the informational part of it without the kind of difficulty that we've had?

Part of the trouble we're having here is, we can't get the information we need to even begin to evaluate what's happening.

Or are we really reliant -- I hate to use that word, reliant -- on getting the Federal Energy Commission to do its job?

DR. BORENSTEIN: I guess I'm not -- I can't really answer it. I just don't know what levers the state has to get FERC to either do its job or to make the data available for somebody else to do their job for them.

I haven't really spent much time looking into it, but it doesn't sound like anybody who's tried has had much success.

CHAIRMAN DUNN: One other question here, then I have just two or three at the end of your report.

The very next paragraph states:

> "Although industry concentration and individual firm market share are often correlated with market

> power, this is not always the case. There are many factors beyond the number and size of firms in a market that impact the degree of competition within an industry. These factors include ..."

And then it spills over to the next page. Basically you cite three of them: the incentives of producers; price responsiveness of demand; and the potential for expansion of output by competitors and potential competitors.

I think we have touched upon the first two already in our discussions so far, but the third, the potential for expansion of output by competitors and potential competitors, can you comment on that?

DR. BORENSTEIN: Actually, there's another paper which you might be getting to called something like, "Understanding Competitive Pricing and Market Power in Wholesale Electricity Markets" that does this.

Basically, when you're a firm and you're thinking about how much to produce, and you recognize that producing less potentially will raise the price, the question you ask is: is it worth it to produce less?

On the one hand, I don't sell as much. But on the other hand, the stuff I do sell, I get to sell at a higher price.

The question is, how much less do you have to sell for a given increase in price?

Two things essentially drive that. One is,

whether when you cut back your sales, demand just says, fine, we'll just buy less. In other words, they aren't really desperate to get the stuff.

Or, whether the demand is, in fact, absolutely rigid and has to happen, the other extreme, inelasticity demand.

The other factor is, if I cut back, is there some other producer who will just expand their output and very easily, without much change in price? So, is there some other producer who stands ready to offer their product, with maybe only a slight bump up in price?

Then I'd be selling less, and I wouldn't get much of a price increase.

So, you want to think about both the demand responsiveness and the supply responsiveness of other sellers.

The problem is that in the electricity market, the way production works is, if I cut back, if the market's tight, other producers don't have any more to put in. That's exacerbated tremendously by the fact that electricity is not storable.

I mean, all production processes effectively have some capacity limit. It's just that Christmas tree ornaments don't sell for a thousand times more the day before Christmas because they're storable. They build them in advance, and then, if they don't sell them that day, they just hold them.

Christmas tree ornaments are sort of the example of something that does peak in price, because you've got to store it all the way until next year.

But with electricity, you can't store it at all.

If you don't sell it right now, it's gone, and you can't build up supplies in advance for that peak you want.

CHAIRMAN DUNN: Going to Page 18. You've got it as 0209, Donna.

The last paragraph states:

> "We have contrasted the approach to market power that relies heavily on concentration measures with the alternative oligopoly equilibrium simulation approach that we, and others, have employed in recent work. This approach takes actual cost, demand, and transmission capacity data into account when employing an oligopoly equilibrium model of

the electricity market."

The question I actually have here relates to FERC still, in viewing this market, seems to stand by the concentration approach to examining market power.

Other than FERC, within the economics profession, are there others who would agree that that is the proper evaluation for market power in the wholesale electricity market?

DR. BORENSTEIN: I can't think of anybody who at this point thinks that the concentration measure approach is particularly useful at all.

Some people might say, well, you could still use it as a starting point. You've got to use much lower cut offs

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than you would use for most other industries, and I might even agree with that.

But everyone now recognizes that it's going to be a very, very imperfect guide.

CHAIRMAN DUNN: Our only holdout is FERC?

DR. BORENSTEIN: Yeah. It's hard to believe they're still a holdout, but I guess, from what I've heard, they are.

CHAIRMAN DUNN: All right.

Let's go ahead not to the next one, which is your August '99, which is "Understanding Competitive Pricing and Market Power in the Wholesale Electricity Market."

Again, much of this we've touched upon. I want to go, Donna, you've got it as 0183. It's Page I, and highlight the footnote at the bottom of that page.

Again, something we've talked about here. Do you remember this one?

DR. BORENSTEIN: Pretty much, yep.

CHAIRMAN DUNN: Basically, what you're saying here is that for there to be collusion, it does not have to be explicit. It can be tacit collusion. In fact, you say:

"For instance, through its behavior, a firm might make it clear that it will restrict its output only if another firm does the same ..."

et cetera, et cetera.

"It is widely acknowledged that

such tacit collusion is difficult to carry out unless firms interact repeatedly, and is always difficult to detect."

This is basically what you had said a few years earlier in one of your reports. I know this was basically a paper to say, "Here, folks. Understand when you're looking at a market that things you're going to look at."

By this point in time, had you done any sort of examination on whether that interactive behavior was impacting what we see going on?

DR. BORENSTEIN: No, and I haven't still, actually. The only work I'm aware of is Steve Puller's, my graduate student, but that is his work. And he has -- that's the only work I'm aware of that's actually tried to move in this direction.

CHAIRMAN DUNN: The very next page, Page 10, second paragraph. This is a section where you talked about "Efficiency and Equity Concerns with Market Power."

The first paragraph talks about how often times particularly we, public policy makers or the media, zero in on the cost impacts of market power.

But in that second paragraph, it starts, "It is much less difficult ..." You talk about efficiency concerns in the exercise of the market power in a given market.

Can you explain that?

DR. BORENSTEIN: Yeah.

When economists talk about efficiency, they

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generally talk about two different notions of inefficiency. One is the wrong total quantity getting consumed because essentially there's a producer out there who could produce it -- "it" being whatever good -- for less than some buyer would be willing to pay for it, and somehow they don't get together. Market power causes that, because a firm restricts its output and doesn't sell, even though that last unit would be profitable, because it would drive down the price on all the other units.

That sort of inefficiency is not very large in electricity markets because the demand is so insensitive to price that even when the price gets jacked way up, you still see pretty much the same quantity consumed.

However, there's another inefficiency, and that is, for a given quantity that's going to be produced in a market, who is going to do the production? And the beauty of a competitive market is, if the market is truly competitive, it will automatically in the market process line up the cheapest producers first to produce the product.

Here's where market power comes in and screws that up.

I'm a firm that has a block of capacity that's pretty cheap, but it's enough capacity that if I restrict output, I can drive price up. I think, for instance, if I'm a firm that has 4,000 megawatts of capacity, and the last few megawatts of my capacity has a marginal cost of $70. And if the market were completely competitive, it would go out to that capacity, use up some of my $70 dollar capacity, but not all of it.

The next highest cost unit, let's say, that some other firm owns out there is a $90 unit. I figure out that if I cut back my output a bit, they're going to have to call that $90 unit in order to meet all the demand. And that's going to drive the price up in the whole market to $90. And I do the calculation, how much do I have to restrict my output, how much would I lose in the quantity I sold, versus how much would I gain by increasing the price on the stuff I do sell, and I figure out it's profitable to do it.

So, I do that, and the market price goes up. Besides just the transfer of wealth -- I get more money and consumers are left with less money -- there's another problem, which is, we now have a $90 generator running, while a $70 generator isn't fully loaded. We could have provided more of that power at $70 and saved on the total production cost of a given amount of power.

That paragraph is pointing out that if a firm has market power, when they restrict their output to exercise market power, forcing a higher cost unit to come on line, it creates that sort of inefficiency.

MR. DRIVON: Would that effect be exacerbated if the same firm owned both the generators?

DR. BORENSTEIN: If the same firm owned both the $70 generator and the $90 generator, they would be then looking to probably the next highest cost generator when they pulled off generation. They would pull off the 70 generator and leave the 90 off, then there'd be some $140 generator that would have to come on. And so, you'd have an even bigger inefficiency.

MR. DRIVON: And to some extent, the cost of that generator's production would be controlled, or at least influenced, by the cost of the fuel, and by the cost, at least modern times here in California, of the NOx credits.

So, if your fuel cost was higher, and your NOx credit expense was higher, that would result in a higher cost basis for your production; correct?

DR. BORENSTEIN: Yeah. You're sort of moving to a different area, but yeah, to the extent that changing the production process, for instance, forcing that $140 unit to come on that needs a whole lot of NOx credits to run, you actually would raise the value of the NOx credits you have. And that would justify a higher price for your units if, for instance, FERC were doing an ex-post review and said, "Well, how do you justify that price?" Suddenly those NOx credits are justifying it.

MR. DRIVON: Have you heard the term recently, NOx credit laundering?

DR. BORENSTEIN: No.

MR. DRIVON: Trust me, you will.

DR. BORENSTEIN: Okay, I'll look forward to it.

CHAIRMAN DUNN: Let's go to 0185, Page 11.

There's a sentence in there under Section 6, second paragraph, that says:

> "When market power is found to be present, the logical next step is to examine the sustainability of that market

> power."

Can you explain that?

DR. BORENSTEIN: Yeah. The DOJ, the Department of Justice, is very clear in their analysis of market power that it's not just the ability to raise prices, but you also have to consider how long they can raise prices for. The guidelines say something like, a significant increase in prices for a substantial length of time, but it's become -- their rules of thumb have gotten used, and I think the rule of thumb that some people reference is, less than a year is not something to worry about.

Unfortunately, the FERC has once again, I would argue, mindlessly adopted that rule of thumb, and has at times made the argument that market power that's transient isn't something to worry about.

Well, the DOJ, I think -- and if they didn't think this, they were just being less complete than they should have -- didn't view these as hard and fast rules. If the price is going to go to $2 billion even for a couple days, that's a real problem.

So certainly, even if the market power we're going to see this summer were only going last through this summer, and even if on January 1st, 2002, it were all going to disappear, a responsible public policy would do something about that, because the potential run-up in prices is enormous. It could be billions of dollars.

And so, this idea once again of just adopting a guideline and applying it mindlessly gets you into a situation

where you -- you make bad public policy.

What this paragraph's saying is, you've got to consider both: How high the price can be driven up, and for how long.

Unfortunately, as we've learned, electricity markets, well, having a great short-run volatility, have a very long-run, long process of changing on the supply side. You don't get new generation on in a month. And so, we can get stuck for fairly long periods of time. That's why this summer is going to be horrendous; next summer is going to be pretty bad; and 2003 will probably be okay, at this point anyway.

But it would help if we could get Las Vegas to stop air conditioning their sidewalks right now.

CHAIRMAN DUNN: Very true.

Let me just zero in on the sustainability from your perspective here in California.

Do you have an opinion on the sustainability? I know there's other factors, and you've talked about that, price being the other one; $2 billion over two days is something that's got to be considered.

But in looking at the sustainability of market power in the California wholesale electricity market, what do you find?

DR. BORENSTEIN: I haven't spent a lot of time looking at this, but my impression is that if we are willing to open up siting, are willing to do the siting we need to do, and if we are careful about monitoring ownership of the output, and if we're willing to move on the demand side to get more

responsive demand, I think that this market can still move towards a competitive framework in the course of a few years.

It's not going to happen this summer. It's not going to happen next summer. But beyond that, I think the sustainability of the sort of the market power we see right now is probably not a long run, decade-long issue.

CHAIRMAN DUNN: You made the comment that one of the factors was, be careful about the ownership of the generation. Explain that a little more specifically.

DR. BORENSTEIN: If all the new ownership -- all the new plants are built and owned by companies that already have large stakes in the state, we're likely to still see market power problems.

We would like to see the market become less concentrated at the same time.

That's not to say that we shouldn't allow Dynegy or Reliant to build plants. It's to say that we would also like to see plants built by other companies. We'd like to see more capacity, period. But the best new capacity would be capacity by players who aren't very large or aren't here at all.

This also, by the way, is part of a bigger concern about the western grid. It isn't just concentration of ownership in California. It's concentration of ownership in the western grid. Some of the players who are pretty large in California have been buying plants outside California, but those are plants that have a great deal of effect on the California market.

I have talked to people at the Department of

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Justice about this, and they are -- they can't directly comment on it, but they have assured me they're aware of the issue.

CHAIRMAN DUNN: The generation facilities that are expected to come on line in California in the next 24 months, do the ownership of those that will come on line satisfy you that it is sufficiently diverse that it wouldn't complicate the problem we already find ourselves?

DR. BORENSTEIN: Well, I don't know, is the answer, both because I haven't really studied the roll out of new plants, and because I don't know contracts they're under. And this gets back to our earlier discussion, we need to know more than just who actually physically owns the plant. We need to know who controls the output, and who has the financial stake in the output.

CHAIRMAN DUNN: One of the other things that I believe we talked about at our last hearing -- and I know you weren't there or listening You had much better things to do, I'm sure -- that as new plants come on line, we run the risk of not really extracting ourselves from the situation we find ourselves in, because as one new one comes on, one of the 40-year-old plants could go off line permanently?

DR. BORENSTEIN: Yeah, it's definitely an issue that has gotten too little focus, that what matters here is the net expansion. And to the extent we start losing plants, or force them out for environmental reasons, that's just going to make it tighter.

CHAIRMAN DUNN: Senator Bowen, did you have anything?

SENATOR BOWEN: No.

CHAIRMAN DUNN: Let's go to the next one, February 2000, "Electricity Restructuring: Deregulation or Reregulation."

What prompted this report?

DR. BORENSTEIN: We were actually contacted by the Cato Institute. This was published in Regulation, which is a publication of the Cato Institute, asking us if we would write a piece on electricity deregulation. And it sort of came at a time when Jim and I really wanted to put down sort of the bigger view. We had been doing these very detailed analyses of market power, and of transmission issues. And we wanted to put down the bigger view of, you know: What is deregulation? Can it work? If so, how can it work?

And we were, frankly, a little surprised and thought it was sort of humorous to be asked by the Cato Institute, which has a reputation for a very right wing bent, that they wanted us to write a paper. Although, I had actually written other papers. This publication is a pretty broad-minded publication.

So, we wrote this, and it just lays out our general take on where deregulation is, and where the problems are likely to be.

CHAIRMAN DUNN: I want to ask about you just a couple things there, because the paper's pretty self-explanatory, and obviously I don't want us to sit here and go through it all.

Let's skip up to 0170 in the Conclusion section.

You state:

> "A move toward deregulation that does not take the issue of market power seriously can undermine the goals of industry restructuring and even, as in the case of England, produce a regulatory backlash."

Can you educate us a bit about the England example?

DR. BORENSTEIN: Well, what happened in England is, they deregulated. They went to a more deregulated market in 1991, I believe. And they gradually ran into more and more problems.

They actually had a lot of generation under long-term contracts at the time of deregulation. And as those contracts came off, they found that having too large players, who together, I think, had over 60 percent of the capacity, was a real problem.

As that unfolded further and further, what England went towards, as they saw more problems with market power, was something that's not really very viable in the United States, which was an informal regulatory interaction, where essentially the regulator would periodically say, boy, those prices are looking way too high.

There was a lot gentlemanly negotiation between the regulator that effectively ended up back in a pretty regulatory situation, where the regulator had a day-to-day

interaction with how the players were behaving.

At the time we were writing this, they were restructuring yet again, partially to get rid of the pool, the centralized approach which was falsely blamed for their high prices. And in the process, they also were moving towards what was -- and I think we might even make reference to it here -- what was good behavior clauses that said, essentially, the generators had to behave well or there would be some sort of regulatory effect.

And we saw this as sort of, oh, yeah, the ominous good behavior clause. We saw this as in some ways the worst kind of regulation because nobody's quite sure what it means. It just says, boy, you better act nice.

And the one thing that has come up periodically in California are these statements that, you know, these generators are just out to make as much money as they can. To which an economist says, that's right. That's how the capitalist system works. Firms try to make money, and if the market's competitive, their process of trying to make money results in good things for consumers. If the market's not competitive, it can result in bad things for consumers.

But deregulating on the notion that we're going to deregulate, but then we're going to have a good behavior clause make sure everything works out right is sort of the most vague, amorphous, but heavy-handed sort of regulation. And that was the point we were making here.

CHAIRMAN DUNN: Where is England now in its process?

DR. BORENSTEIN: England has gone to this non-pool approach. Doesn't seem, at least the early reports I saw, to be having the desired effects. And in fact, it's had some negative impacts in terms of particularly small generators, who had a very easy time with the pool; they just bid in their generation. Now, they've got to have a marketing arm and so forth. And there are marketing companies coming in and contracting for the power of a lot of these small generators, which is exactly what you don't want to have happen.

So, they are operating under that system, and they're running into a lot of problems. They do have these good behavior clauses. I haven't really followed how much they've been used, or how they've been used.

CHAIRMAN DUNN: Can you explain real briefly the difference between pool and non-pool?

DR. BORENSTEIN: A pool is, if it had been the case at the time of deregulation in California that everybody was required to sell their power into the PX, and everybody was required to buy their power out of the PX, we would just have been in a centralized pool situation.

The California design had a hybrid. Although -- where you could do it through the pool, the PX, or you could just do it as a bilateral trade.

It wasn't quite that simple, because the utilities were required to buy out of the PX for the first four years, and there's a complex interaction when you took the ISO, made the ISO separate from the PX.

But fundamentally, a pool is just a central

market. And if it's a mandatory pool, where everybody has to trade through that market.

MR. DRIVON: I understand that there was something to learn from the New Zealand experience in terms of residual market power affecting their deregulation situation.

DR. BORENSTEIN: I'm not going to be a good source on this. I didn't follow --

MR. DRIVON: What I wanted to ask is --

DR. BORENSTEIN: -- the New Zealand situation.

MR. DRIVON: -- and maybe you're not the person, but what I wanted to ask was whether there had been anything in the maturation of their experience there that might be helpful to us?

DR. BORENSTEIN: I'm not the right person.

The only thing I know is, in the process, they had this major transmission line meltdown that cut off one of the major cities for three weeks.

MR. DRIVON: We don't want that.

DR. BORENSTEIN: We'd rather not have that happen.

CHAIRMAN DUNN: I want to go to the next one, which is the August 2000 report.

Actually, Before we do that, my apologies, I want to go back to the report we were just finishing with, and go to Page 0164, which is Page 10 of the report. Very middle paragraph that starts with, "Some industry participants."

You have the following phrase in here:

"Some industry participants and

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observers have responded to evidence of market power by arguing that market power is present in every market, so it shouldn't be a concern here, or even that market power is necessary in order for firms in electricity markets to recover their full costs and earn a reasonable return on their investment."

You state: "Both claims are incorrect."

Can you explain that to us?

DR. BORENSTEIN: Okay. The first argument is that every seller has some market power, and so you shouldn't be too worried when you find market power.

The first clause is wrong. It isn't true that every seller has some market power. Though in most markets, every seller has at least a little bit.

We never claimed, for instance, in Borenstein, Bushnell, and Wolak, the market power analysis, that if we found market power, we should just ditch the whole deregulation, or even that FERC should reimpose cost-based rates.

It was a question of how much. And it was also a question of comparison over time to see if things changed, and sure enough, they did.

The idea that every seller has market power is a notion from retail purchasing. It's not a notion from commodity

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markets.

If you look at the commodity page of the Wall Street Journal where what's listed is gold, silver, pork bellies, wheat, those sorts of things, most sellers in those markets have zero market power. They are what economists could call pure price takers.

If you talk to a gold mining company, they do not go out and say, well, if we produce more gold, what'll that do to the price of gold? They try to guess at what the price of gold is going to be, but they behave as if their own production is going to have no effect. And that's so close -- that's true, basically.

Farmers do not look at their individual wheat production and say, well, how's that going to move the price of wheat? They don't have market power.

So, in those commodity markets, there is not, for the most part, market power. There has been some concern occasionally in certain markets, platinum, for instance, but most of those, there just really isn't an issue.

Electricity is different. Electricity, because it's nonstorable, and because it's localized, is not the sort of market where every player is so tiny that they have no effect.

The second part of this statement is that market power is necessary. And this is just a fundamental misunderstanding of economics. The people argue that if you don't have market power, you only get your marginal cost, how can you ever cover your fixed costs?

Well, you don't get your marginal cost. You get

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the market marginal cost in a competitive market. So, some of the time, you are what economists call infra-marginal, inside the margin. So, you get a price above your marginal cost.

And if you work through the economics of that, you find -- and there's a numerical example in this paper that shows why everybody can cover their total cost of production, and the market adjusts to do that.

So, the argument that, if we didn't have market power, we'd all go out of business, is just wrong.

CHAIRMAN DUNN: Have you heard any other arguments? I mean, some say it exists everywhere; some say it's necessary. Those are the two that --

DR. BORENSTEIN: Those are the ones.

These, by the way, have disappeared. Nobody any more is worried, is saying, well, you know, we're really worried about covering our costs. That hasn't been at the forefront of the discussion in the last year.

CHAIRMAN DUNN: It seems to have evolved -- and correct me if you have a different perception within the economic circles -- to, the argument is basically, there is nothing wrong with market power. That's what --

DR. BORENSTEIN: No, I don't think it evolved to that. I think even back all along, it was an argument that market power is not, in itself, illegal.

It's also not something you want to have a whole lot of. So, I don't think that people have said market power is okay. There are people who say there isn't much market power still.

CHAIRMAN DUNN: Not many people saying that, though.

DR. BORENSTEIN: Hogan is saying -- no, he isn't saying that. In fact, Hogan's latest writing said -- didn't even say that there isn't much market power. It said, boy, yeah, here's your best guess, but there's so much noise in your guess that it could be that there's actually zero market power.

CHAIRMAN DUNN: But he doesn't conclude that there is minimal or no market power?

DR. BORENSTEIN: No. To my knowledge, nobody has done an empirical analysis that has resulted in a conclusion that there isn't market power.

There are these analyses, like Hogan's, that critique other analyses and say, well, you can't be sure. But they haven't actually offered their own analysis that shows that there isn't market power.

CHAIRMAN DUNN: All right.

I actually just have a few questions left on the remaining two conclusions, and one other thing after that.

Let's go to the next report, August 2000, entitled: "Diagnosing Market Power in California's Deregulated Wholesale Electricity Market."

DR. BORENSTEIN: This is the paper I've been referring to as BBW, which is now sort of the standard reference. Everybody calls it that now. Which, if Borenstein, Bushnell and Wolak ever write another paper together, will be confusing.

CHAIRMAN DUNN: You're just going to have to get authors in which the acronym comes up with some clever word.

DR. BORENSTEIN: One of us will have to change our last name.

CHAIRMAN DUNN: There you go.

I want to go to the Conclusion section. It says:

"The results indicate that market power in California's wholesale market was a significant factor during the summers of 1998 and 1999, though somewhat less so in 1999."

Why? Do you have any explanation for why less so in '99?

DR. BORENSTEIN: '99 was cooler summer. '99 was a pretty good hydro year. Essentially, the market wasn't as tight. If the market isn't as tight, what BBW points out is something that we argued theoretically back in the -- with the BB, the simulation paper, is that market power will be exercised when the market is tight to a much greater extent than when it's not. And '99 was a cooler and better resource summer.

CHAIRMAN DUNN: As we sit here in May of 2001, how would you characterize 2000?

DR. BORENSTEIN: Our analysis says that 2000 was a really bad summer. It was, I guess, a slightly below average hydro year, and demand has continued to grow in the whole western grid, and so we've run into some -- we ran into some real problems.

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And probably the sellers just got more sophisticated, which is sort of the scariest part of it. If it's not just that we had an aberration in characteristics, but they're just getting better at it, then we've got a bigger problem.

CHAIRMAN DUNN: Learning this market with every passing month.

DR. BORENSTEIN: Yep.

CHAIRMAN DUNN: Even better.

In fact, as alleged fixes have been attempted along the way, it just seems that the focus has changed; that the fixes really didn't fix. It just changed how market power may have been exercised.

DR. BORENSTEIN: Well, I think many of us have argued that, exactly, that the fixes were not going to fix things, particularly the ones coming out of FERC were just completely misguided.

SENATOR BOWEN: By its definition, there's no way to fix market power.

DR. BORENSTEIN: No, no, no. I would disagree. I'd say there's two obvious fixes.

One we can do right away, but we haven't stepped up to the plate, which is pricing electricity in a way to get demand responsiveness. Because if you get demand responsiveness, as it explains -- as I've explained in other reports, it not only just -- it not only shifts demand in, which is good conservation. It means there's less demand, so the market's not as tight.

But by making demand price responsive, it tells the seller, if you try to jack up price, one of the things that's going to happen is, people are just going to buy less. That makes it less profitable to withhold in order to jack up price.

SENATOR BOWEN: Buy less, but the fact remains that if you're a dairy, and you're going to lose your sterility, or if you're a chip fab and you're going to lose a million dollars' worth of inventory, you will pay any amount.

DR. BORENSTEIN: Yeah, but if you know that the -- if you schedule your runs on Saturdays, the prices are a lot lower, and you move to Saturdays and thereby take something off the top on a summer afternoon, you will pay less, and you will undermine the exercise of market power.

SENATOR BOWEN: Undermine but not --

DR. BORENSTEIN: You won't completely eliminate it.

And then the other thing that we should have done but didn't do is, we should have forced divestiture into much smaller firms, and monitored the contracts so that we know that firms don't have a -- aren't in a position where they have a financial position that would --

SENATOR BOWEN: We can't do that; right? We, the state.

DR. BORENSTEIN: Well, we could have forced divestiture into much smaller firms back then.

SENATOR BOWEN: At this point.

DR. BORENSTEIN: At this point, I don't think the

state has the legal ability to now force more divestiture.

I actually think that the DOJ does, by the way, but they haven't gone that route.

CHAIRMAN DUNN: You anticipated one of my questions. You mentioned about this coming summer, and what we could do.

The last report, and again, I just want to touch upon real quickly, is January 2001, entitled: "The Trouble With Electricity Markets (and some solutions)."

And again, much of this we have touched upon. Anything that we haven't that we should add here? What brought this report?

DR. BORENSTEIN: Well, this is the paper that -- this is what I did on my Christmas vacation. It's true. My wife wasn't terribly happy about it.

This was a paper that was just sort of in me, and I had to get it out because I felt like this was my contribution to understanding what had gone wrong.

This is the paper that laid out the taxonomy I walked through with Senator Bowen, that there were three causes: that there were cost increases; that there was this issue that when the marginal units costs went up more, it drove up the price for the whole market; and then there was the fundamental issue of market power.

But it pointed out that you just -- the way demand and supply work in electricity markets, it is very unlikely that you could ever have a stable market without market power if you are going at this completely through a spot market

with no demand responsiveness, which is what we did.

It then argues -- and some solutions. The two solutions were: buying more power on long-term contracts, which not only just reduces volatility, but it mitigates the ability of sellers to exercise market power, because if you've sold a bunch of your power forward, it's not really worth it to restrict your output on the last few hundred megawatt hours to drive up the price, if the you've already got -- if the price on that stuff's already locked in; and to build more demand responsiveness through real-time pricing.

And this paper tries to make -- I had been in a discussion with President Lynch of the PUC and Senator Feinstein, where they had expressed concerns about raising prices so much that it would hurt companies.

And the last part of this paper points out how you can have a lot of volatility in retail prices, while still having a reasonable average price. And tried to sell the idea that real-time pricing is not about raising prices. It's not just a Trojan Horse to stick the large industrials with all of the costs.

For whatever average price you want to charge large industrials, the right way to charge it is in a time varying nature, so they understand it costs more to consume power on a hot summer afternoon than on a cool Saturday.

And if we had done this back in October, when I started really ranting about this, we could now be in a situation where we would have most of the industrial and commercial consumers on real-time pricing. And I think it would

largely have mitigated the problem we're going to face this summer, because we would have seen some real changes.

Not all of the companies would have moved to Saturday work days, but some of them would have. Not all of them would have changed their air conditioning, but some of them would have. And they would be doing it with economic incentives.

Instead, we're scrambling at the last minute, and as I said four hours ago or three hours ago, it's probably time to move to command-and-control approaches, because it's too late now for a pricing system to have much effect.

CHAIRMAN DUNN: The last thing I want to spend a few minutes on, Professor, is May 25th. You and a number of other economists authored a letter to the Honorable George W. Bush, the Honorable J. Dennis Hastert, and the Honorable Trent Lott.

Can you give us the background to the letter? I have a few questions about it, but give us the background.

DR. BORENSTEIN: This was Frank Wolak's suggestion. Frankly, I was sort of skeptical at first. And he was right. This actually got some attention. I thought we'd waste a lot of time hashing it out, and then it would just disappear, but maybe we just lucky on the timing. It happened right at the Bush-Davis meeting.

But he suggested we write a letter that just put us down on record saying, this market not working. There are things the FERC can do. The FERC should be doing them. The FERC is not doing what it should. And as far as we, as

economists, understand the law, it is not upholding the Federal Power Act.

And I thought it was a fine idea. And Frank did the first draft, and a number of us gave him comments, and you can imagine ten economists trying to write a letter together.

CHAIRMAN DUNN: Almost as bad as ten lawyers.

DR. BORENSTEIN: Yeah, particularly because part of it was ten economists pretending they were lawyers. So, there was, "What does the Federal Power Act really mean" stuff.

So, we eventually sort of triangulated on this draft that said the market is not working; the FERC has said it's not working; and yet, the FERC's remedies have been completely ineffective, actually counter productive. There are things they could do; they should do them.

CHAIRMAN DUNN: Has there been any response to the letter at this point?

DR. BORENSTEIN: From Bush, Hastert or Lott, no. There's been no response from them.

CHAIRMAN DUNN: Any other response from any source?

DR. BORENSTEIN: Yeah. We've received quite a bit of positive feedback of people saying, you know, we're really glad you wrote this; you know, we hope FERC will respond to it.

I understand, but I have not seen it, I think the L.A. Times reported that there was a response letter signed by a different group of economists, but I haven't managed to track it down. I heard about it last night, and I'm curious to see who

would sign the letter.

CHAIRMAN DUNN: A response to your letter?

DR. BORENSTEIN: I suspect it's a letter that says, price caps are a bad idea.

We don't actually call for price caps, though. We call for mitigation, and we say, price caps are one form of mitigation, and I think all of us think that price caps would be better than doing nothing.

But Frank Wolak has suggested another approach that would require a lot of contracting that I think is a very good idea. It also has implementation problems.

None of these would be perfect, but there are a lot of things that they could do.

CHAIRMAN DUNN: Is it fair to say that among this distinguished group of economists that signed this letter of May 25th, that you've got within that group some big fans of having electricity move to a truly free and competitive market arena, versus a regulated format?

DR. BORENSTEIN: I think it would be fair to say that every signer, I believe, thinks that ultimately we should go to a deregulated wholesale electricity market.

There are more differences of opinions over how the retail end should be structured, probably.

CHAIRMAN DUNN: So, nobody can dismiss this group as saying they're big fans of a regulated arena?

DR. BORENSTEIN: No. I mean, we're all economists. We all see the power of markets. We are also, this group, all realists about markets having potential shortcomings,

and see that those shortcomings have shown up in spades here.

CHAIRMAN DUNN: Let me just ask a couple quick questions, specifically about some of the language.

I think you've got that in there, Donna.

This is actually Page 2 of the letter. That first full paragraph, the very last sentence actually of that one. It says:

"We cannot expect a market to
operate to benefit consumers or
for the resulting wholesale
prices to satisfy the requirements
of the Federal Power Act if
effective competition does not
exist."

Are you aware of any commentary FERC has made through, either informally or in any of its publications, opinions, et cetera, about their view of the existence of competition in the California wholesale electricity market?

DR. BORENSTEIN: I'm aware that in November they said that the prices were not just and reasonable. I guess that's the only thing I could cite as FERC expressing opinions on this.

Well, no actually. And then with their latest price mitigation plan, I guess what they said is, well, I guess there is market power, but only during Stage One, Two and Three alerts, which they don't support for good reason. It's not a supportable assertion.

CHAIRMAN DUNN: I don't know if you were here

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during my introductory comments.

We had Mr. Robert Pease, the lawyer from FERC, testify. And he acknowledged in his testimony that in his opinion, the market is not a competitive market here in

California.

It seemed to at least us, in listening to that testimony, that would undermine the whole premise for market-based rate authority if, in fact, we don't have the competitive market even by FERC's own lawyer's testimony.

DR. BORENSTEIN: Yeah, it would sure seem that way. But then, it would have also seemed in November, when they said prices were unjust and unreasonable, that that would be cause for rescinding market-based rates, and they didn't at that time.

CHAIRMAN DUNN: Again, I'm sure it's rank speculation. Any opinion as to why?

DR. BORENSTEIN: Well --

CHAIRMAN DUNN: We asked the lawyer that.

DR. BORENSTEIN: You'll be shocked to hear this, but I think it's politics.

CHAIRMAN DUNN: The answer we got from the FERC lawyer was, you'll have to ask the Commissioners that question, the very people the FERC lawyers wouldn't let come and testify.

DR. BORENSTEIN: Right.

CHAIRMAN DUNN: Just for my own clarification, one of the sentences states, and this is where you were giving the background:

> "Generally FERC allowed
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>
> suppliers to sell at market-based rates if they met a set of specified criteria, including a demonstration that the relevant markets would be characterized by effective competition."

Is my understanding correct, that the way that they allegedly demonstrated that was by showing that they did not have market power?

DR. BORENSTEIN: No. It's by showing that they didn't have market power, and by -- showing that they didn't have market power was done by showing that these concentration rules, these guidelines, were not violated.

CHAIRMAN DUNN: Where every economist but those within FERC suggest is not the correct analysis.

DR. BORENSTEIN: That's true as far as I know. I don't know of anybody who suggests that's the right way to think about it.

CHAIRMAN DUNN: That's true. In fact, the experts hired by the State Auditor seem to agree as well. Not with FERC, but with you, Professor.

This particular letter, I mean, this actually isn't a new view held by you; is it? This is a view that you've held for some time.

DR. BORENSTEIN: No, this is view that we started -- we started talking about the empirical side of this with BBW way back when Bushnell and I wrote the simulation paper. We talked about the risk of this.

You know, this sort of brings us to this question that I have asked the various people who have tried to say there isn't market power, which is, why not? If you were a generator, and you had 4,000 megawatts of capacity in California, and it's a hot summer day, why wouldn't you exercise market power? Why wouldn't you be able to?

I asked Bill Hogan this question. He and I had an e-mail exchange. And I have to say, frankly, his response was pretty unconvincing. He said, well, maybe RMR contracts, reliability must-run contracts, would mitigate the problem, which is just completely -- that's not what RMR contracts are there for. They're to mitigate very localized bottlenecks, so there's no reason to think they would mitigate the problem.

He said, maybe they've sold lots of their power forward in a firm contract that would reduce the incentive to exercise market power.

Well, maybe. We haven't seen it. We haven't seen those contracts. You would think that if that was the case, generators would have a pretty strong incentive to say, "Look here!"

This is, by the way, what El Paso is claiming in the gas case. They're trying to show that their contracts wouldn't give them an incentive to. And there's a controversy about whether they would, but we haven't seen that. It's also a question about why they would want to do that.

He suggested -- he made an argument that, I think, he just got the economics wrong, that they wouldn't have an incentive to because their marginal generators are making

enough money, and the argument doesn't hold together.

Then he said, well, maybe it's because of price caps and threats of regulation. To which my response is, okay, that seems like an argument for price caps and threats of regulation.

So, I haven't heard the argument yet that would explain why, if you were a generator, you wouldn't exercise market power.

And it's important, because this isn't just an issue about California. This is an issue about electricity markets generally, and what FERC should be doing in their policy towards electricity markets.

And the answer is, you know, we don't have to go through these -- as much as we will, and Ed Kahn will, and everybody else -- these minutia of exactly when and how did you exercise market power. We just have to say, "Look, is this a market that's set up in a way that firms wouldn't want to exercise market power," that they just wouldn't be in a position to.

And the basics of where we are don't support that. If you own 4,000 megawatts in this market, you are in a very strong position to exercise market power.

CHAIRMAN DUNN: Would you agree, and I think it was Professor Wolak who testified at our first hearing that said, if in fact a market participant has market power, historically in economic analysis, market participants with market power don't give it up voluntarily?

DR. BORENSTEIN: Yeah. I mean, they're in the

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business of making money. They're in the business of making money for their shareholders.

If I were a shareholder, and they said, oh please, break us up into small companies, you know, the shareholders would sue the management.

CHAIRMAN DUNN: It would take, at least historically, as we've looked at market power in a variety of different markets, it takes an external factor to do that, to that given market participant. For example, whether it's the hand of regulation, or it's new entrants into the market that defuse market power, it's got to be something external?

DR. BORENSTEIN: Yeah.

CHAIRMAN DUNN: Senator Bowen.

SENATOR BOWEN: One final question, Professor.

When we talk about setting up the market so that it works, isn't it the case that even if no one has market power in a particular year, that doesn't mean that you should stop monitoring, because as market conditions and demand and supply change, it could very well be that two years, or five years, or fifteen years out, the landscape has shifted?

DR. BORENSTEIN: Well, yeah, I agree with that right now.

I think actually if we move towards a healthier demand side of the market, we wouldn't need to do as much monitoring.

I mean, we don't monitor for market power in the airline industry. The DOJ has oversight generally on antitrust issues.

And the reason -- airlines, by the way, have this -- also this characteristic of nonstorability and strict capacity constraints.

SENATOR BOWEN: Although, I think many people would argue that on non-hub routes, that airlines do, in fact, have market power.

DR. BORENSTEIN: I would think they would argue that on hub routes, too. I've been in that argument for the last 15 years. But --

CHAIRMAN DUNN: Are we talking about the Sacramento-Orange County run?

DR. BORENSTEIN: We've got to get Southwest in there.

SENATOR BOWEN: Southwest charges the state almost double for a flight from LAX to Sacramento than what the United contract calls for.

DR. BORENSTEIN: That's very interesting.

Well, I do know when Southwest came into California, the prices, we couldn't -- we suddenly could afford to go down and give a seminar at UCLA.

But in the airline industry, there is demand responsiveness. That is, if somebody jacks up the price, it will cause damage. There will be losses from high prices, but people have -- people do different things.

SENATOR BOWEN: They have alternatives.

DR. BORENSTEIN: They do, but it's not accurate to say, well, electricity isn't like that. Electricity isn't like that by design, not by necessity.

There is electricity demand that is absolutely necessary, but there is a whole lot of discretionary demand.

If we had a system where people were aware of the price of electricity -- and this would take time. This is not just an economic change. This is a psychological change.

We have been taught in the last 50 years essentially not to think about electricity. You get your bill at the end of the month, and you just pay it. You don't even look at the quantity. You just look at the bottom line number, which is, by the way, why I think the rate increase -- and I use the term broadly -- for residential consumers will have almost no effect.

The vast majority of residential consumers will not see a noticeable increase in their bill. Their marginal kilowatt hour price may go up, but their bill's going to go up a few percent, 10 percent maybe.

In that case, if they're not going to think about electricity, they're not going to change their behavior.

If we had a healthier demand side, where it was priced to indicate what it really costs to produce, it would change the whole process of consuming electricity.

We don't have to do that. We can go back to the old regulatory process. The old regulatory process didn't do that, and as a result, we also had generators that ran two hours a year because we had to fulfill that super peak. We never got rid of it just by telling people, now is a good time to back off.

I think that's an environmentally unsound way to

proceed. I think the right way to do this is to price electricity so people understand what they're consuming. If we did that, we would have more price responsive demand, and we would, I think, have less need for market monitoring.

That isn't a prescription for next year or the year after. That's a prescription for 10 or 15 years from now.

CHAIRMAN DUNN: Let me ask a follow-up to that, Professor. I want to take a hypothetical.

If the demand suggestions that you are making, and obviously, you're not the only one, either won't be done or can't be done, I think it's probably more the "won't" as opposed to the "can't". But let's just hypothetically say they're not going to be done.

But still, the goal is to minimize, if not eliminate, market power in this market. What recommendations would you have to address that, without the issue of the demand side that you've addressed?

DR. BORENSTEIN: Long-term contracts and a very unconcentrated production side. Those are the only things that are going to get you there if you're not going to work on the demand side.

You bring in a lot of new generation by going to outside the market players and saying, or them coming to you and saying, "We'll sign a contract for the power out of your generator for the next 20 years. Come on into the market."

If you do some of that, it will greatly reduce the ability of the right now large, but shrinking as share, players in the market.

But to be honest, I think that if that's all you do, it's not going to work very soon. We're not going to be growing demand that fast and having that much new generation.

We really have to have price responsive demand, or I think this fundamentally isn't going to work.

CHAIRMAN DUNN: Anything further?

I think we reached the end.

DR. BORENSTEIN: I beat Frank by an hour.

CHAIRMAN DUNN: There you go. We're improving in our processes along the way here.

Professor, thank you very much for your patience, your education, your input. Greatly appreciate it.

We are through.

[Thereupon this portion of the Senate Rules Committee hearing was terminated at approximately. 5:55 P.M.]

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CERTIFICATE OF SHORTHAND REPORTER

I, EVELYN J. MIZAK, a Shorthand Reporter of the State of California, do hereby certify:

That I am a disinterested person herein; that the foregoing transcript of the Senate Select Committee hearing, held at the State Capitol on May 31, 2001, was reported verbatim in shorthand by me, Evelyn J. Mizak, and thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said hearing, nor in any way interested in the outcome of said hearing.

IN WITNESS WHEREOF, I have hereunto set my hand this ______ day of __________________, 2001.

____

EVELYN J. MIZAK
Shorthand Reporter